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FISH FOR THE FORESTS

By L. F. KNEIPP

PROGRESS in the actual administration of forested areas within these United States brings a growing realization that there are other products of the forest besides timber, forage and water-power. There is, for example, that inestimably valuable product—health; health of body and of mind. No individual citizen can spend a fortnight in a national forest without having a more hopeful outlook upon life, a higher mentality, a more vigorous body. The development of the recreational aspects

A WONDERFUL TROUT STREAM.

THE McCLOUD RIVER IN SISKIYOU COUNTY, CALIFORNIA, IS ONE OF THE BEST TROUT STREAMS IN THE COUNTRY. IT FLOWS FROM THE ETERNAL SNOWS AND GLACIERS OF MT. SHASTA AND CONTAINS THE FAMOUS DOLLY VARDEN AND RAINBOW TROUT.

THE VALLEY RANCH.

THIS IS ON THE PECOS NATIONAL FOREST, NOT FAR FROM SANTA FE, NEW MEXICO. THE PECOS RIVER FLOWS AT THE FOOT OF THE BLUFFS IN THE BACKGROUND AND IS A NOTED TROUT STREAM. DEER AND OTHER GAME ABOUND IN THIS REGION.

of the national forests makes for better citizenship and deserves encouragement.

Relaxation within a forest if only during a very brief period inevitably awakens man's primitive instincts of the chase no matter how dormant they may have been. But the big game has almost passed away; the pitiful remnant is rigidly protected by laws strictly enforced, and the fall and winter are the only times to hunt. The summer camper therefore, who wishes to give a demonstration of reversion to type has only one outlet for his energies, one way in which to display his skill in woodcraft; that way is to fish; to whip the roaring mountain torrents for trout, or to troll in the more slowly moving streams for bass, to be rewarded perhaps by suckers, or whitefish, or even an humble and not wholly attractive juajolote.

But aside from the question of healthful sport there is another consideration and that is the economic value of the waters within the forests for purposes of food production. The forests contain thousands of bodies of water ranging from tiny blue alpine lakes nestling under the highest peaks to rivers carrying the waters of a hundred good-sized tributaries. Properly planted and protected these waters will support numbers of fish so enormous that they will occupy an important place in the national diet. In many parts of the west private fish hatcheries and ponds are now being operated on a commercial basis and it is certain that the production of fish under controlled conditions will some day be an important industry.

The number of persons who annually visit the national forests to fish is difficult even of approximation, but it runs into the hundreds of thousands. In Colorado alone 10,000 people, it is estimated, went fishing on the opening day of the season of 1913. Probably more than half of this number spent the day within the National Forests. Each year sees an increase in the number of campers and fishermen and it may safely be predicted that within a few years over one million people will visit the forests each year.

ALONG A FAMOUS TROUT STREAM.

THE SUMMER HOME OF JOHN W. RINCKEL ON THE McCLOUD RIVER, SHASTA NATIONAL FOREST, CALIFORNIA. THIS RIVER IS FAMED FOR ITS WONDERFUL TROUT FISHING AND IS ONE OF THE FEW STREAMS WHERE THE DOLLY VARDEN TROUT ARE FOUND. THESE, AND RAINBOW TROUT, ARE LARGE AND PLENTIFUL.

Unfortunately there is a very definite limit to the number of fish that a given body of water will support. A stream may become overstocked just as readily as a pasture and, so far as the stock are concerned, with as disastrous results. Then, too, there are many obstacles to full natural reproduction so that the fish cannot reproduce as fast as they are captured or destroyed. To these difficulties may be added the losses caused by cloudbursts which sweep the fish from the streams, or by drouths that leave the fish stranded in small pools in which they finally perish, or by unscreened irrigation ditches, through which the fish are carried into field and meadows, where, of course, they die, or by the pollution of streams by mill tailings, sawdust, coal dust, or sewage. Another fruitful cause of loss are laws which allow fishing before or during the spawning season. In this connection it should be understood that fishermen and hunters in the national forests are subject to the game and fish laws of the States in which the forests are situated. Excessive fishing is in itself sufficient to deplete a stream, but when it is coupled with one or several of the complications enumerated, the fishing value of the stream is temporarily and all too often permanently destroyed.

During the past three years the considerations mentioned have led certain of the national forest districts to give increasing attention to the question of replenishing depleted streams and stocking the bodies of water which are capable of supporting fish life but do not contain fish. Examples of private enterprise have demonstrated most conclusively that a small expen-

COTTONWOOD CAMP.

DEEP IN THE DENSE SHADE OF THE BIG TREES ALONG FOUR MILE CREEK ON THE EAST SLOPE OF THE CASCADES, CRATER NATIONAL FOREST, OREGON.

diture of time and energy is productive of large results as, for example, in the case of Dad's Lake on the Washakie Forest where a nosebag full of trout fry carried from Big Sandy in 1903 has resulted in a lake now teeming with choice fish. At first the interest in the subject was individual, later it extended first to forest and then to district organizations until at present the recommendations for planning operations threaten to exhaust the total capacity of all federal hatcheries and must necessarily be subject to selective processes by the Bureau of Fisheries.

It is not the intention of the Bureau of Fisheries to furnish in any case a number of fish greater than that required to form the nucleus of a brood stock which, if properly protected and afforded opportunity to reproduce, will in course of time stock the stream in a natural way. The Forest Service, unfortunately, lacks the authority to protect the fish during the period of establishment and as a natural sequence many of the planting operations are only temporarily effective, yet, while the results are not so good as they would be if it were possible to protect parts of streams to provide spawning grounds and allow the fish to attain a fair size they still are sufficiently successful and encouraging to justify the work.

The first step in restocking is the determination of the length, width and depth of the body of water to be stocked, its sources and outlet, its temperatures, the character of the bottom, the kinds of vegetable life it contains, the rapidity of flow, character of lands traversed, and the kinds of fish already

there. One should also know the dates of previous plantings with kinds of fish used, and degree of success or non-success; also the extent to which the stream is polluted by sawdust or other deleterious substances; the principal kinds of food of the fish; number of irrigation ditches and extent to which they are screened. With such data before it the Bureau of Fisheries can determine approximately the number and kind of fish which should be allotted. In some cases the kind of fish requested is not adapted to the waters to be stocked, sometimes because the food supply is unsuitable and frequently because the introduction of the fish applied for would be detrimental to the kinds which the waters already contain. The Bureau of Fisheries will not, for example, furnish spiny finned fishes such as the bass or perch for introduction into waters containing trout or salmon, nor will trout or landlocked salmon be allotted for waters containing voracious fishes such as bass or pickerel. Only one application will be considered for any particular body of water and only one species of fish will be assigned an applicant during any one season. These are simply illustrative of the factors which guide the Bureau of Fisheries in its allotments of fry.

The majority of the waters within the forests are turbulent mountain streams or icy alpine lakes, consequently trout are in stronger demand than any other species. The blackspotted trout which is native to the Rocky

A Fishing Camp.

THIS IS ON THE ANGELES NATIONAL FOREST IN CALIFORNIA. THE LONG STRING OF FISH IS AN INDICATION OF THE QUALITY OF THE SPORT.

FERTILIZING TROUT EGGS.

AFTER A QUANTITY OF SPAWN HAVE BEEN STRIPPED INTO A RECEPTACLE THE EGGS ARE FERTILIZED BY STRIPPING A MALE FISH OVER THEM. THE SCENE IS AT SEVEN LAKES IN THE PIKE NATIONAL FOREST, COLORADO.

Mountain region is propagated in relatively large numbers and liberal allotments are made, but there is a heavy demand for rainbow and brook trout that can not always be filled since the Bureau's facilities for propagating these species in the Rocky Mountain region are comparatively limited. Bass are in good demand, and Forest officers seeking originality or recalling memories of boyhood days will even petition for the humble catfish and the lowly carp, to say nothing of suckers, sunfish, and other modest members of the finny tribe. These applications must stand the acid test of the Bureau's experts before they receive approval.

At last the application is approved and the Ranger designated has received the post card and telegraphic announcements of the day, hour and minute upon which the fish car will arrive at the appointed spot. In almost every case the Ranger before submitting the application solicits the cooperation of the leading disciples of Izaak Walton in the particular locality to be benefited. In practically all cases this is given in ungrudging measure for there is increasing realization of the fact that fish planting work is beneficial both to the individual and the community. So as the moment set for the arrival of the fish car draws near there is around the depot quite a congregation of automobiles, where they can be used, or of light rigs drawn by fast teams, or in some cases of packhorses. Whatever the style of conveyance used it generally bears a motley assortment of receptacles for the fry, for while, in cases of emergency, the Ranger may borrow the receptacles from the fish car itself, it is understood that as a rule he will provide all necessary cans.

TROUT FOR RESTOCKING STREAMS.

THE TROUT IN THESE CANS WERE PLACED IN STREAMS IN THE BLACK HILLS NATIONAL FOREST. AS LONG AS THE CANS ARE IN A MOVING VEHICLE THE NATURAL MOVEMENT OF THE WATER IS SUFFICIENT TO AERATE IT.

Almost in a moment the train has come, the fish have been swiftly transferred from the fish car to the waiting vehicles, the Ranger has signed the receipts on the run and the train is gone. From this stage until the fish are finally deposited in the waters for which they are destined the work is exacting and haste and unerring judgment are essentials of success.

Compared to the bulk of water and number of fish contained the air surface of the ordinary receptacle is altogether inadequate and the water must be aerated. So long as the cans are in a moving vehicle the natural movement of the water is sufficient, but if movement is suspended the water must be dipped up and allowed to drain back at frequent intervals. Sometimes the transportation of fish across low valleys during the heat of the day increases the temperature of the water to such an extent that unless the cans are iced many of the fish will perish. If the fish are held in the receptacles for any length of time the water must be replenished and care must be taken to see that the water is suited to the fish and does not contain alkali or other injurious ingredients. There is imperative need to transport the fish to the point of deposit without delay and throughout its various stages this part of the work is marked by feverish haste. Changes from motor cars to wagons, from wagons to pack horses, are made with the least

possible delay. Finally the distributor must repress all tendencies to display his relief and enthusiasm by pouring out the fish from the height of his shoulder, for this is one way of lessening the chance of success.

If given reasonable care the young fry can be transported over very considerable distances after delivery from the car with a quite small percentage of loss. In one case, on the Shoshone Forest in Wyoming, eight cans of fry were in transit a part of two days and three cans were in transit a part of three days without any loss whatever. Each night the cans, their tops covered with cheesecloth, were placed in running streams with mouth upstream, while proper care was given during the day. Out of 40,000 fry shipped to the forest only eighteen were known to have died.

In 1911, 34,000 trout were shipped from Rock Springs, Wyoming, to the Bridger Forest, 110 miles via motor-car, followed by a long trip on pack horses. Approximately 50 per cent of this shipment was lost. Another consignment to the Washakie Forest involving distribution by means of pack-horses resulted in a loss of 30 per cent. These figures, however, are not discouraging, for the numbers of fish safely deposited in the waters were sufficient to restock them. As a very general rule the Forest officers fully appreciate the difficulties surrounding the transportation of fish to remote semi-inaccessible waters and do not submit applications unless they are fully

METHOD OF AVOIDING SHOCK TO YOUNG FISH.

BY GRADUALLY POURING INTO THE CAN WATER FROM THE STREAM IN WHICH THE FISH ARE TO BE PLACED, THEY ARE SAVED FROM THE DANGEROUS SHOCK OF BEING SUDDENLY PLACED IN WATER OF QUITE A DIFFERENT TEMPERATURE. AFTER THIS CHANGE HAS BEEN MADE THEY MAY BE PLACED IN THE STREAMS.

RESTOCKING THE STREAMS.

AFTER THE WATER IN THE CAN HAS BEEN AERATED AND BROUGHT GRADUALLY TO THE SAME TEMPERATURE AS THE STREAM THE FISH ARE GENTLY ALLOWED TO GO INTO THEIR NEW HOME. THIS STREAM IS IN THE BLACK HILLS NATIONAL FOREST, SOUTH DAKOTA.

prepared to take every precaution necessary to secure the successful establishment of the fish.

The work very frequently involves considerable personal sacrifice on the part of the forest officer since the fish car, once it begins its rounds, is no respecter of official hours and a person to whom fish are consigned must be prepared to receive them on very short notice at almost any hour of any day or night. As a result many of the fish are transported and planted at night or on Sundays and holidays and the work is performed with such haste that it really interferes but little if at all with the officer's regular official duties.

The demands from the field have become so numerous that in the district which has led the others in this work steps have been taken to systematize future operations along this line. A total of 273 bodies of water distributed among twenty-four Forests in Colorado and Wyoming have been selected for restocking during the coming nine years and the number of fish required to supply each separate body has been carefully estimated. According to the plan the initial distribution in 1914 amounts to more than four million fry but a gradual reduction will be made each year in the number planted until in 1922 only six hundred thousand will be distributed. This work, involving little if any cost to the Service and practically no interference with regular work, has proved immensely popular with the people who resort to the forests for rest and recreation and has done much to make the forests more valuable to the public.

SMALL FIRE LOSS

THE fire season in Oregon practically ended with the arrival of general rains which started September 6th. The year will be long remembered as one of the driest ever experienced in the State. For a period of seventy-four days no rain fell and the forest fire situation of necessity became extremely critical. Since Weather Bureau records have been kept in the state (43 years) the longest period of drought recorded prior to 1914 was fifty-seven days. In spite of the long dry period, however, the Oregon Forest Fire Association reports very slight loss of green timber through fire.

A general rain commencing September 6 and continuing for several days, ended the longest period of drought experienced in Oregon during the past fifty years. The fire hazard was further increased by the fact that during the past winter the snowfall in the mountains was extremely light and disappeared fully six weeks earlier than usual.

The conditions during the fire season, therefore, were such as to test out thoroughly the patrol organizations built up during the last four years, and the results have been more than satisfactory. Data sufficient to compile definite figures is not yet available at the State Forester's office, but it is certain that at least 1,200 fires occurred during the season, which is more than the combined total of the previous three seasons. Most of these fires originated in old burns and logged areas and due to the efficiency of the Federal, association and State patrolmen practically all of them were stopped before green timber was damaged. Owing to the extreme dryness, fires were controlled with great difficulty, and more money was spent for this purpose than in any season since 1910.

The patrol force on privately owned land showed an increase of about 100 men over that of last year. This was, in part, due to the Congressional appropriation of $25,000 for the patrol of the Oregon and California Railroad grant lands, which made it possible to place 46 patrolmen in the field.

Early in August patrols were materially increased, until some 400 State, Weeks Law and privately employed wardens were guarding privately-owned timber.

Fires were numerous, but only in a few cases did they reach any considerable size. The dense smoke resulting from the fires was, however, no inconsiderable handicap to lookout men and wardens generally, as it made prompt detection of fires difficult.

At the present time reports are not available to show the exact damage resulting from forest fires, but it is known to be inconsiderable.

Since 1914 has been the driest summer ever recorded in Oregon, it is the opinion of timber owners generally that it has now been demonstrated that adequate patrol can keep fire from doing damage and makes stumpage an entirely safe investment.

Washington had over 100 fires during August. Some logs have been burned but very little damage to settlers has resulted, and only a small amount of green timber has been damaged. The chief danger until rains come is high winds. Fires started during the season are being carefully guarded, but unusually bad conditions might result in their breaking out and causing damage as well as heavy expense to fight them. Over 200 regular, Association and State wardens, are on duty. No rain fell in July or August and the woods were extremely dry.

Idaho associations have had unusually bad and expensive fires to contend with. Prompt action and the employment of a large number of fire fighters has, however, prevented great loss of green timber. Not less than 200 fires were handled during August, the bulk

of these having been caused by lightning and ranchers burning slashings. Two arrests for failure to secure permit before burnings have been made. With heavy dews and cooler weather the fire-fighting forces controlled all of the fires.

Montana reports an extremely dry and dangerous year. A large number of fires have occurred on Government and private land necessitating the employment of large crews of fire fighters. Numerous lightning fires have occurred and though all fires have been promptly detected and fought, the season will not be one without loss of green timber.

Incomplete reports from California indicate that conditions continue more favorable than last year, and that fire losses have been light.

The absence of future damaging fires will mark 1914 as the most successful season, taking conditions into account, that has ever been experienced by fire protection agencies. Cooperative patrol has everywhere shown its efficiency and preparations to meet a bad year which have been going forward the past two favorable seasons, have helped during the present dangerous year. Comparative absence of East winds on the Pacific Coast has been the only factor favorable to the work of fire suppression this season, which in many sections is the driest since Weather Bureau records have been kept. Cost of protection will, of necessity, be high in most localities.

THE FIRE GUARD ON PATROL

(With apologies to Danny Deever.)

"What are the bloomin' boxes for?" said the Fire Guard on patrol,
"To drop a note, to drop a note," the Forest Ranger said.
"What makes them look so big, so big?" said the Fire Guard on patrol.
"So they can hold a bushel o' notes," the Forest Ranger said.
"For you've got to ride around, around, a-lookin' for fires each day,
You've sure got to hump yourself, if you want to draw the pay—
This ain't no foolish outin' job, so I heard the Super say,
For you've got to visit the mail box every morning."

"What makes the country look so blue?" said the Fire Guard on patrol.
"It's forest smoke, it's forest smoke," the Forest User said.
"What makes the Rangers ride so hard?" said the Fire Guard on patrol.
"To reach a fire, to reach a fire," the Forest User said.
"They're fightin' forest fires, they're whippin' 'em around,
They're fightin' 'em like devils, they're beatin' em to the ground,
And they'll put you through your paces if they catch you loafin' 'round,
For you've got to visit the mail box every morning."

"What's that so black against the sun?" said the Fire Guard on patrol.
"It's forest fires, you bloomin' it," the Forest Ranger said.
"What's that that crackles o'er head?" said the Fire Guard on patrol.
"It's fallin' trees, it's fallin' trees," the Forest Ranger said.
"For the Forest's goin' up in smoke, you can see it fade away,
We're all goin' to jack our jobs, for *we* don't need the pay—
Oh, the Fire Guards are shakin', and they'll get their time today—
For they didn't visit the mail box every morning."

—*J. D. G.*

THE ROOT SIDE OF AN OLD FASHIONED STUMP FENCE.

A STUMPER OF A FENCE

By EDWARD F. BIGELOW

AN easterner visiting Michigan is attracted by the stump fences more than by almost anything else. Aside from these stump fences, the farms, the uplands and the marshes are not much different from those of New England. One misses the characteristic stone walls of New England but finds in their place the most novel fences in the world—those made of stumps that have in recent years been pulled out of the ground by powerful machines constructed for that purpose. The force required to pull such stumps from the ground is enormous, but it is applied slowly, in submission to the decree of Nature that what is gained in power must be lost in speed. These stumps are relics of the liveliest lumbering ever seen anywhere else in the United States and that ended about thirty years ago, in Big Rapids, Grand Rapids and their vicinity. Old-timers entertain the visitor by the hour with reminiscences of the amazing number of logs that were cut in that region. Logging somewhat similar, but not nearly so extensive, still continues in the northern part of Michigan, but does not equal in extent nor in picturesqueness that which formerly took place on the famous Muskegon River.

A FOREST OF STONE

By F. H. KNOWLTON, *United States Geological Survey*

REMARKABLE fossil forests exist in Yellowstone Park, the most remarkable, it is believed, of the several fossil forests which have been discovered—there are others in Egypt, in California and in Arizona—because in the Yellowstone most of the trees were entombed in their original upright position and not found recumbent and scattered about the ground. In Arizona, for instance, the fossilized trunks have evidently been carried a long distance from where they originally grew. In the Yellowstone the trees now stand where they grew, and where they were entombed by the outpouring of various volcanic materials. Now as the softer rock surrounding them is gradually worn away they are left standing erect on the steep hillsides, just as they stood when they were living; in fact, it is difficult at a little distance to distinguish some of these fossil trunks from the lichen-covered stumps of kindred living species. Such an aggregation of fossil trunks is therefore well entitled to be called a true fossil forest. It should not be supposed, however, that these trees still retain their limbs and smaller branches, for the mass of volcanic material falling on them stripped them down to bare, upright trunks.

These fossil forests cover an extensive area in the northern portion of the park, being especially abundant along the west side of Lamar River for about 20 miles above its junction with the Yellowstone. Here the land rises rather abruptly to a height of approximately 2,000 feet above the valley floor. It is known locally as Specimen Ridge, and forms an approach to Amethyst Mountain. There is also a small fossil forest containing a number of standing trunks near Tower Falls, and near the eastern border of the park along Lamar River in the vicinity of Cache, Calfee, and Miller Creeks, there are many more or less isolated trunks and stumps of fossil trees, but so far as known none of these are equal to the fossil forest on the slopes of Specimen Ridge.

The fossil forests are easily reached over the wagon road from the Mammoth Hot Springs, or from the Wylies Camp at Tower Falls, and they are in their way quite as wonderful and worthy of attention as many of the other features for which the Yellowstone National Park is so justly celebrated.

Recently another extensive fossil forest has been found on the divide between the Gallatin and Yellowstone Rivers in the Gallatin Range of mountains, in Park and Gallatin Counties, Mont. This forest, which lies just outside the boundary of the Yellowstone National Park, is said to cover 35,000 acres and to contain some wonderfully well preserved upright trunks, many of them very large, equaling or perhaps even surpassing in size some of those within the limits of the park.

In the beds of the streams and gulches coming down into the Lamar River from Specimen Ridge and the fossil forests one may observe numerous pieces of fossil wood, which may be traced for a long distance down the Lamar and Yellowstone Rivers. The farther these pieces of wood have been transported downstream, the more they have been worn and rounded, until ultimately they become smooth, rounded "pebbles" of the stream bed. The pieces of wood become more numerous and fresher in appearance upstream toward the bluffs, until at the foot of the cliffs in some places there are hundreds, perhaps thousands of tons that have but recently fallen from the walls above. One traversing the valley of the Lamar River may see at many places numerous upright fossil trunks in the faces of nearly vertical walls. These trunks are not all at a particular level but occur at irregular heights; in fact, a section cut down through these 2,000 feet of beds would disclose a succession of fossil

A Fossilized Redwood

This is one of the finest specimens in the forest. It is 26½ feet in circumference and twelve feet high. The roots are as large as an ordinary tree, and are embedded in solid rock.

forests. That is to say, after the first forest grew and was entombed, there was a time without volcanic outburst—a period long enough to permit a second forest to grow above the first. This in turn was covered by volcanic material and preserved, to be followed again by a period of quiet, and these more or less regular alternations of volcanism and forest growth continued throughout the time the beds were in process of formation.

The area within which the fossil forests are now found was apparently in the beginning an irregular but relatively flat basin, on the floor of which after a time there grew the first forest. Then there came from some of the volcanoes, probably those to the north, an outpouring of ashes, mud flows, and other material which entirely buried the forest, but so gradually that the trees were simply submerged by the incoming material, few of them being pros-

trated. On the raised floor of the basin, after a time, the next forest came into existence, only to be in turn engulfed as the first had been, and so on through the period represented by the 2,000 feet or more of similar beds. The series of entombed forests affords a means of making at least a rough estimate of the time required for the upbuilding of what is now Specimen Ridge and its extensions.

During the time this 2,000 feet of material was being accumulated, and since then to the present day, there has been relatively little warping of the earth's crust at this point; that is, the beds were then, and still are, practically horizontal, so that the fossil forests, as they are being gradually uncovered, still stand upright.

When the volcanic activities had finally ceased, the ever-working disintegrating forces of nature began to tear and wear down this accumulated material, eroding the beds on a grand scale. Deep canyons and gulches have been trenched and vast quantities of the softer materials have been carried away by the streams and again deposited on lower levels or transported to great and unknown distances.

The fossil forest that was first brought to scientific attention is on the northern slope of Amethyst Mountain, opposite the mouth of Soda Butte Creek, about 8 miles southeast of Junction Butte. The following account, by Dr. William H. Holmes, the discoverer of these fossil forests, shows the impression first made by them:

As we ride up the trail that meanders the smooth river bottom [Lamar River] we have but to turn our attention to the cliffs on the right hand to discover a multitude of the bleached trunks of the ancient forests. In the steeper middle portion of the mountain face, rows of upright trunks stand out on the ledges like the columns of a ruined temple. On the more gentle slopes farther down, but where it is still too steep to support vegetation, save a few pines, the petrified trunks fairly cover the surface, and were at first supposed by us to be shattered remains of a recent forest.

Courtesy of E. C. Alderson.

A WELL PRESERVED TRUNK

ONE OF MANY IN THE GALLATIN MOUNTAINS, MONTANA, WHERE THE FOSSILIZED FORESTS COVER 35,000 ACRES

These trunks may easily be seen from the road along the Lamar River, about a mile away. They stand upright—as Holmes has said, like the pillars of some ruined temple—and a closer view shows that there is a succession of these for-

ests, one above another. In the foothills and several hundred feet above the valley there is a perpendicular wall of volcanic breccia, which in some places attains a height of nearly 100 feet. The fossil trunks may be seen in this wall in many places, all of them standing upright, in the position in which they grew. Some of these trunks, which are 2 to 4 feet in diameter and 20 to 40 feet high, are so far weathered out of the rock as to appear just ready to fall; others are only slightly exposed; niches mark the places from which others have already fallen; and the foot of the cliff is piled high with fragments of various sizes.

Above this cliff fossil trunks appear in great numbers and in regular succession. As they are all perfectly silicified, they are more resistant than the surrounding matrix and consequently stand above it. Most of them are only a few inches above the surface, but occasionally one rises as high as 5 or 6 feet. The largest trunk observed in the park is found in this locality. It is a little over 10 feet in diameter, a measurement that includes a part of the bark. It is very much broken down, especially in the interior, probably having been so disintegrated before it was fossilized. It projects about 6 feet above the surface.

In many respects the most remarkable of the fossil forests is on the northwest end of Specimen Ridge, about a mile southeast of Junction Butte and about opposite the mouth of Slough Creek. So far as known, this forest was first brought to scientific attention by Mr. E. C. Alderson, of Bozeman, Mont., and the writer, who discovered it in August, 1887. It is found on the higher part of the ridge, and covers several acres. The trees are exposed at various heights on the very steep hillsides, and one remarkable feature of the forest is that most of them project well above the surface.

One of the largest and best preserved trees stands at the very summit of the slope. This trunk, which is that of a giant redwood, is 26½ feet in circumference without the bark and about 12 feet in height. The portion of this huge trunk preserved is the base, and it exhibits to a considerable degree the swelling or buttressing so well known in the living redwood. The roots, which are as large as the trunks of ordinary trees, are now embedded in solid rock.

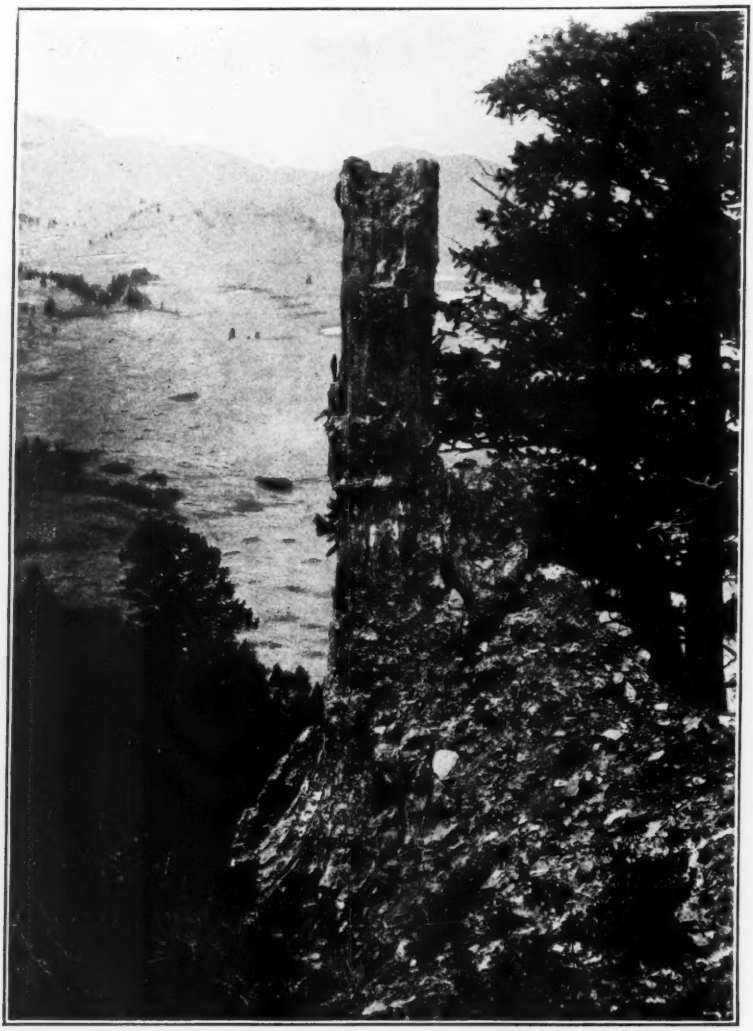
Courtesy of E. C. Alderson.

UPRIGHT TRUNK AND "HOODOO"

The "hoodoo" consists of volcanic material in which the trees were entombed and uneven erosion has left it standing, a grotesque rock form.

TWIN TRUNKS OF THE FOSSIL FOREST.
THESE ARE ON SPECIMEN RIDGE, YELLOWSTONE NATIONAL PARK. THEY ARE TWO FEET IN DIAMETER, TWENTY FEET APART AND TWENTY-FIVE FEET HIGH.

The height attained by the trees of this fossil forest can not be ascertained with certainty, since the tallest trunk now standing is only about 30 feet high, but every one observed is obviously broken off, and does not show even the presence of limbs. Perhaps the nearest approach to a measure of the height is afforded by a trunk that happened to have been prostrated before fossilization. This trunk, which is 4 feet in diameter, is exposed for a length of about 40 feet, and as it shows no apparent diminution in size within this



A Fossilized Pine.

The pine which grew a million years ago, now turned to stone, and near it two living pines. Note the thick bark along the trunk of this fossil tree. The tree is three feet in diameter and thirty feet high.

distance it is safe to assume that the tree could hardly have been less than 100 feet high and very probably may have been higher. This trunk is wonderfully preserved. It has broken up by splitting along the grain of the wood into great numbers of little pieces, which closely resemble pieces of "kindling wood" split from a clear-grained block. In fact, at a distance of a few yards it would be impossible to distinguish this fossil "kindling wood" from that split from a living tree.

The large redwood trunk already mentioned as being nearly 10 feet in diameter may be compared with its

ANOTHER SPECIMEN SHOWING BARK.

THIS ANCIENT OF ANCIENTS IS ALSO SURROUNDED BY LIVE TREES MANY OF THEM BEING OF THE SAME SPECIES.

living relative of the Pacific coast in order to calculate its probable height. The living redwood is usually 10 to 15 feet in diameter and ranges in height from 200 to 340 feet, and as the two are so very closely related there is no reason to suppose that the fossil trunk was of less height, but by a moderate estimate it may be accredited with a minimum height of 200 feet.

The most accessible fossil forest is west of the Tower Falls Soldier Station and the Wylie camp on the road from the Grand Canyon to Mammoth Hot Springs, by way of Mount Washburn. It is on the middle slope of a hill that rises about 1,000 feet above the little valley and may be reached by an easy trail. As the traveler approaches the forest he will observe a number of

UPRIGHT AND PROSTRATE TRUNKS.

WHILE THE TALLEST TRUNK NOW STANDING IS ONLY THIRTY FEET THE PROSTRATE TRUNKS INDICATE THAT MANY OF THE TREES WERE OVER ONE HUNDRED FEET HIGH.

trunks standing upright among the stumps and trunks of living trees, and so much resembling them that a near view is necessary to convice him that they are really fossil trunks. Only two rise to a considerable height above the surface. The larger one is about 15 feet high and 13 feet in circumference; the other is a little smaller. As the roots are not exposed, it is impossible to determine the position of the part in view or the original diameter of the trees, as the bark is nowhere preserved.

Above these standing trunks lie many others, which the disintegrating forces of nature break up into small fragments and keep at about the same level as that of their surrounding matrix. Some of these trunks rise only a few inches from the surface; others are nearly covered by shifting débris. Their diameter ranges from 1 to 4 feet, and they are so perfectly preserved that the rings of growth can easily be counted. The internal structure is also in most trunks nearly as perfect as when the trees were living.

The forest that is next in size to the one a mile southeast of Junction Butte is on Cache Creek, about 7 miles above its mouth. It is on the south bank of the creek and covers several acres. The trunks are scattered from bottom to top of the slopes through a height of probably 800 feet. Most of the trunks are upright, but only a few project more than 2 or 3 feet above the surface. The largest one observed was 6 feet in height and 4 feet in diameter. Most of these trunks appear to the naked eye to be conifers, but a number are obviously dicotyledons—that is, they were deciduous-leaved trees. The conifers, however, were the predominant element in this as in the other fossil forests.

The slopes of the Thunderer, the mountain so prominently in view from Soda Butte on the south, also bear numerous fossil trunks. Most of them are upright, but only a very few project

PROSTRATE TRUNK OF FOSSIL REDWOOD.

THIS IS ONE OF THE LARGEST OF THE FOSSIL TREES ON SPECIMEN RIDGE FOREST AND IS SO LIKE THE LIVING TREE THAT IT IS IMPOSSIBLE TO DISTINGUISH THE DIFFERENCE IN THE WOOD AT THE DISTANCE OF A FEW YARDS.

more than 2 feet above the surface. No remarkably large trunks were observed at this locality, the average diameter being perhaps less than 2 feet.

Mount Norris, which is hardly to be separated from the Thunderer, also bears a small fossil forest. The trees are of about the same size and character as those in the larger mountain. Fossil forests of greater or less extent, composed mainly of upright trunks, are exposed also on Baronett Peak, Bison Peak, Abiathar Peak, Crescent Hill, and Miller Creek. In fact, there is hardly a square mile of the area of the northeastern portion of the park that is without its fossil forest, scattered trunks, or erratic fragments.

The vast area east of the Yellowstone Lake and the region still farther east, beyond the limits of the park, have not been thoroughly explored, but enough is known to make it certain that these areas contain more or less fossil wood. The stream beds in these areas in many places contain fragments of fossil wood, which indicates that trunks of trees must be near at hand.

An enumeration ofthe kinds of trees that are represented by the woods in the fossil forests of the Yellowstone National Park is interesting. By studying thin sections under the microscope it is possible to distinguish the different kinds with reasonable accuracy and the following species have been detected:

Magnificent redwood, Alderson's pine, amethyst pine, laurel, aromatic bay, Hayden's sycamore, Knowlton's sycamore, Felix's buckthorn, Lamar oak, and Knowlton's oak.

Although only three kinds of coniferous trees have thus far been found in the fossil forests of the park, fully 95 per cent of all the trunks belong to these three species. The preponderance of conifers is probably due to the facts that they were presumably more abundant in the beginning, and that, in general, coniferous wood decays less

rapidly than that of most of deciduous-leaved trees. But the conditions were so favorable for preserving any wood that it is perhaps strange that not more trunks of deciduous-leaved trees have been found there. As it is, however, a greater number are known from the park than from any other region. Thus, the Arizona fossil forests embraced only two species of deciduous-leaved trees; the Calistoga (California) wood only one species, and the forest at Cairo, Egypt, only four species.

The 10 species of trees represented in the fossil forests of the park are by no means the only fossil plants that have been found. The fine-grained ashes and volcanic mud in which the forests were entombed contain also great numbers of impressions of plants, many of them very perfectly preserved.

Photo by F. J. Haynes.

FOSSIL TRUNK NEAR TOWER FALLS.

The question is often asked, how old are the fossil forests? It is, of course, impossible to fix their age exactly in years, though it is easy enough to place them in the geologic time scale. The forests of the Yellowstone National Park are found in the Miocene series of the Tertiary Period. As compared with the eons of geologic time that preceded it the Miocene is relatively very recent, though, if the various estimates of the age of the earth that have been made by geologists are anywhere near correct it may well have been a million years ago. It must be remembered, however, that this estimate involves more or less speculation based on a number of factors which may or may not have been correctly interpreted.

TREE FILLING

CHRISTOPHER CLARKE, of Northampton, Massachusetts, writing to AMERICAN FORESTRY, says:

"I notice that in various illustrations of trees that have had cement fillings to preserve their life many of the fillings have been left unpainted. As I have been interested in this special branch of forestry work for over forty years and have made fillings of over twenty barrels of mixed cement in one filling, I have never left a filling unpainted, using paint as near the color of the bark of the trees as possible. Dark green or nearly black are the colors usually adopted and the filling is hardly noticed when thus painted.

PRACTICAL TREE SURGERY*

By J. FRANKLIN COLLINS

IT IS a well-known fact that trees are subect to all sorts of injuries, from sources too numerous to mention. In a great majority of cases these injuries are allowed to remain untreated—often for years. Rot-producing fungi commonly gain entrance at these places, and eventually the original inconspicuous or unobserved injury develops into a comparatively large area of decay. The real aim of tree surgery is to repair the damage resulting from such neglected injuries and rotted areas.

In most tree-surgery work a few fundamental principles must be observed in order that permanent good results may be realized. Remove all decayed, diseased, or injured wood and bark. When on small limbs, this can often best be done by removing the limb. On larger limbs or on the trunk it may at times mean the digging out of a cavity. (2) Sterlize all cut surfaces. (3) Waterproof all cut surfaces. (4) Leave the work in the most favorable condition for rapid healing. This will often mean the filling of deep cavities. (5) Watch the work from year to year for defects. If any appear they should be attended to immediately.

Tree surgery, or, more properly, tree repair work, is not a mysterious art known only to a favored few who alone are fitted to undertake it. It can be undertaken by any careful man who has a good general knowledge of the structure and life history of a tree, its normal manner of covering wounds, and how insects and decay organisms cause damage, provided he can handle a gouge and mallet, a saw, and a tar brush and applies in a practical manner his knowledge of the anatomy of a tree, together with a generous admixture of good common sense. For work in the tops of trees he will also need a clear head and ability to climb. Many tree owners and many persons in charge of private estates are well qualified to undertake tree surgery if the requisite time is available and they will familiarize themselves with the fundamental principles and operations underlying the work, at least to the extent presented in this article.

PREVENTIVE MEASURES.

It is no easy matter to find a place where the well-worn phrase "prevention is better than cure" could be applied with greater appropriateness than in connection with tree surgery. Ice or wind may break limbs or uproot trees which injure others as they fall. Horses commonly gnaw away portions of the bark of street trees unprotected by tree guards. Telephone, telegraph, and electric linemen with their climbing spurs and saws are notorious mutilators of shade trees, especially in towns where the trimming of trees is not regulated by law. Poorly insulated electric wires of high voltage often discharge heavy currents through the trees. Wheel hubs frequently tear away large pieces of bark. After a few years, decay may penetrate into the interior of the tree from any or all of these injured places (Plate 1, figure 4). This decay may increase from year to year until large limbs, or the trunk itself, become so weakened that they are easily broken by violent storms (Plate 1, figure 6). It requires comparatively little time and expense to clean and paint a fresh injury. It often requires much time and expense to treat properly the same injury after it has been neglected for a few years. Almost every large decayed cavity has resulted from an injury which would have required comparatively little time and effort to clean, sterilize, and waterproof at the time it occurred.

*Extracts from a bulletin by J. Franklin Collins.

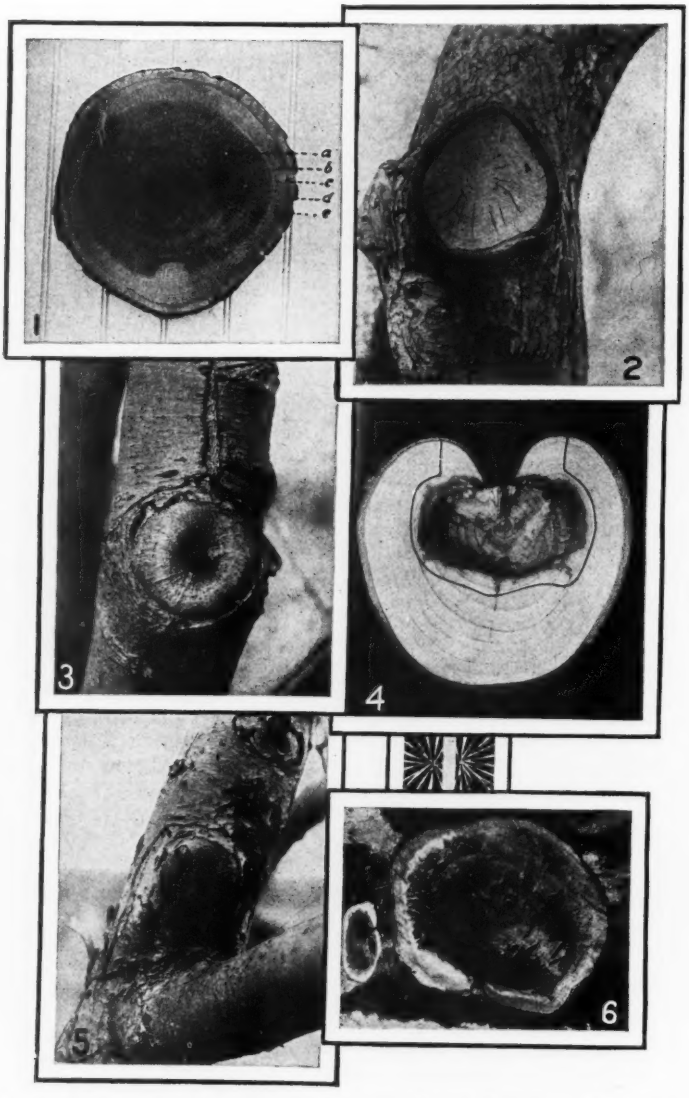


PLATE NO. 1.—PROPERLY TREATED INJURIES, SHOWING NORMAL HEALING, AND UNTREATED INJURIES, SHOWING NORMAL PROGRESS OF DECAY.

Fig. 1.—Cross section of a tree trunk showing location of parts: *a*, heartwood; *b*, sapwood; *c*, cambium; *d*, bark; *e*, corky outer bark. Fig. 2.—A scar beginning to heal over. (Note that it heals more rapidly at the sides than at the top and bottom.) Fig. 3.—A scar about three-quarters healed over. Fig. 4.—Cross section of a 7-year-old blaze on a quaking aspen which has nearly healed over. (Note the large area of decay which originated at the ax cut. The line on the wood indicates the proper shape of the cavity if this had been excavated.) Fig. 5.—A scar from a cut limb entirely healed over. Fig. 6.—End of a log, showing a small opening into the large decayed area; only a shell of sound wood remains.

The most economical and reliable remedy for a decayed area consists in attending to an injury as soon as it is made, perhaps 20 or 30 years before it becomes a menace to the tree. This fact should never be forgotten by tree owners or persons who are charged with the care of trees. If put into practice, it will insure a profit of many hundred per cent on the original outlay.

In its simplest type, tree surgery, as it is popularly understood at the present time, consists in removing dead or decayed limbs or stubs from a tree and treating the scar with an antiseptic and waterproof covering to prevent decay while healing. Another type consists in cutting out the decayed and diseased matter in trees and filling the cavities with cement or other material to facilitate the normal healing-over process. This is often referred to as "tree dentistry," a term which very aptly indicates the character of the work. Filled cavities do not increase the strength of the trunk or limb to the extent that is generally supposed.

The work on dead or diseased branches can be regarded as comprising but two essential operations: (1) Removing the branches in a manner that will prevent injury to the surrounding bark and cambium, which is the thin and usually watery layer of young tissue located between the bark and wood of all healthy parts of a tree, and (2) sterilizing and waterproofing the scars.

For the work of removing branches, the most essential implements are a good-sized saw with teeth so set as to make a wide cut, a gouge, a chisel, a mallet, and a strong knife. For cutting limbs near the ground these are the only necessary implements. For limbs situated elsewhere a ladder may be needed; also, at times, a rope.

A large limb should never be removed by sawing through from the upper side, as this usually strips the bark and wood below the scar (Plate No. 2, figure 1). The proper way is to make the first saw cut on the under side, from six inches to a foot beyond the point where the final cut is to be made (Plate No. 2, figure 2). It should reach from one-fourth to one-half through the limb. A good time to stop cutting is when the saw becomes pinched in the cut. The second cut is made on the upper side of the limb, an inch or two beyond the first one. This is continued until the limb falls (Plate 2, figure 5). After the limb has fallen, a third cut is made close to the trunk and in line with its woody surface (Plate No. 2, figure 4). When nearly sawed through, the stub must be supported until completely severed, so as to avoid any possibility of stripping the bark below as it falls (Plate No. 2, figure 1). The first and second cuts to prevent stripping may be omitted when small limbs which can be held firmly in place until completely severed are being cut.

When the scar is not naturally pointed above and below, it is a good practice on most trees to remove a short triangular piece of bark from the upper edge of the scar and another from the lower edge (Plate No. 2, figure 3), so as to anticipate its dying back at these points. This makes the scar pointed at both ends, the most favorable shape for healing. It is important that some good shellac be applied with a suitable brush over the edge of the bark, especially the cambium, immediately after the cut is made. If the scar is a large one, it is a good plan to use the knife for one or two minutes and then shellac the freshly cut surfaces, repeating the operation until all the bark around the scar has been shellacked. The full benefit of the shellac will not be achieved if many minutes elapse between the cutting and the shellacking, unless the freshly cut surfaces are visibly moist with sap.

If necessary, the woody surface of the scar may now be smoothed off with a chisel and mallet to conform in general shape with the tree trunk. It is bad practice to leave a stub projecting from a trunk (Plate No. 2, figure 6).

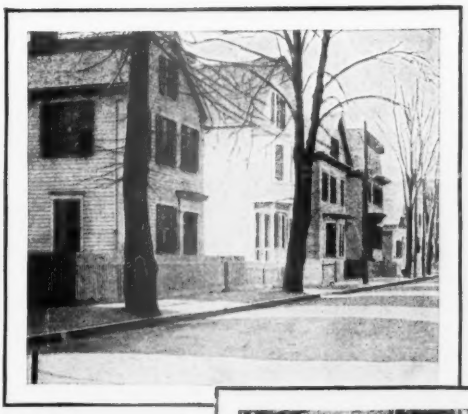
DRESSING THE WOUNDS.

The final operation is to sterilize and waterproof the surface of the exposed wood and bark. For this purpose many preparations have been used. Recent extensive tests by specialists in

PLATE NO. 2.—REMOVAL OF LARGE LIMBS, SHOWING PROPER AND IMPROPER METHODS.

Fig. 1.—A heavy limb improperly cut, showing the stripping as the limb falls. Fig. 2.—Removing a heavy limb; the first cut on the under side is to prevent stripping. Fig. 3.—Removing a heavy limb; the oval scar has been somewhat pointed with a gouge above and below to facilitate healing. Fig. 4.—Removing a heavy limb; the third cut to remove the stub shown in fig. 5 has been completed. Fig. 5.—Removing a heavy limb; the second cut completed; the limb has fallen without any stripping. Fig. 6.—Improperly cut and untreated stubs. The bark of these stubs died mainly as a result of severing all the food-producing organs (leaves) above; decay has entered the trunk from these stubs.

timber preservation indicate that some of the creosotes stand far ahead of all other tested preparations in their power to destroy and prevent the growth of certain wood-destroying fungi and that ordinary creosote, although it does not head the list, is far better than other preparations except some of the less known and less available creosotes. Furthermore, creosote penetrates the wood better than a watery antiseptic. In using commercial creosote, it can be applied with an ordinary paint brush over every part of the exposed wood.



No. 1.—It would be better to make these cavities oval and pointed instead of square or round.

No. 2.—An old injury caused by horses gnawing the bark.

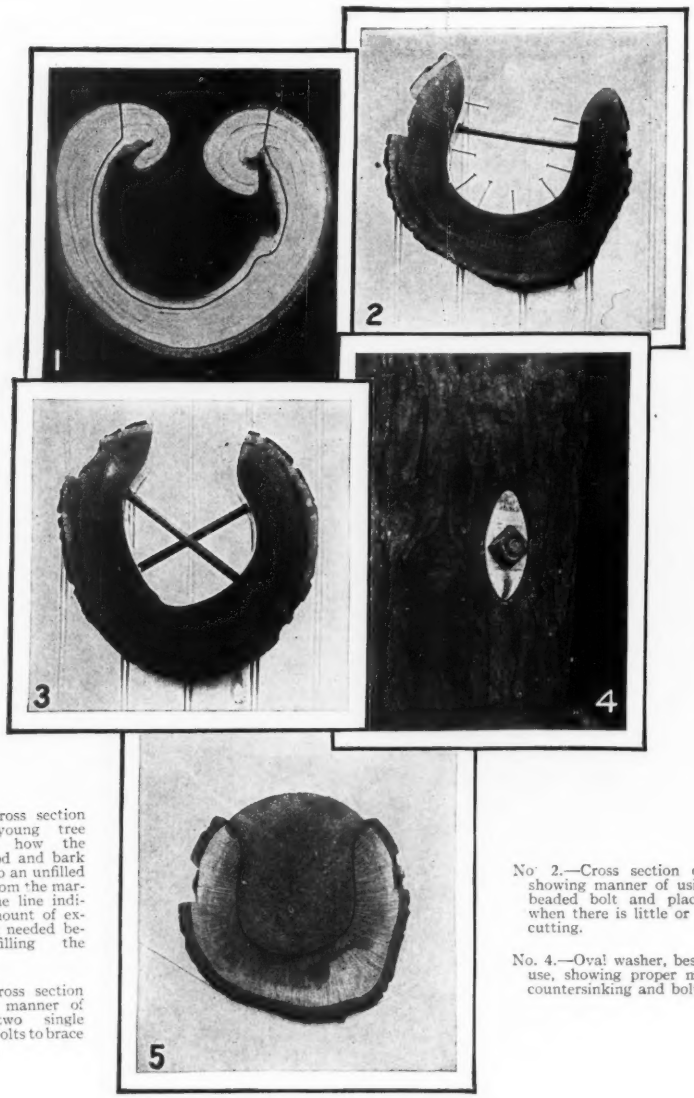
No. 3.—Injury shown in No. 2 excavated and ready for tarring prior to filling.

PLATE NO. 3.—LONG CAVITIES EXCAVATED THROUGH SEVERAL OPENINGS AND SHORT CAVITY EXCAVATED THROUGH ONE OPENING.

The entire shellacked and creosoted surface must finally be waterproofed by painting it with heavy coal tar. A single application of a mixture of creosote and coal tar (about one-fourth or one-third creosote) has been quite extensively used with good results. Although one coating of this mixture may at times be sufficient, it is always safer to follow it with a heavy coat of coal tar.

A good grade of lead paint can be substituted for the tar, if desired, although it is not generally considered as satisfactory; or grafting wax may serve satisfactorily for small surfaces. Asphalt and various preparations containing asphalt are excellent waterproof coverings and would doubtless be more generally used were it not necessary to apply them hot. A good and possibly more permanent method of treating the scars is to char the surface slightly with a gasoline or alcohol blast torch and then cover the hot surface with heavy tar or hot asphalt. Although heat is an excellent sterilizing agent, it does not penetrate so well as creosote and it kills back the cambium to a greater extent.

Permanent waterproofing can be secured only when the treated surfaces are watched from year to year and recoated when any tendency to crack or peel is observed. This is an important step, which is almost invariably neglected by tree owners and tree surgeons.



No. 1.—Cross section of a young tree showing how the new wood and bark grow into an unfilled cavity from the margin. The line indicates amount of excavating needed before filling the cavity.

No. 3.—Cross section showing manner of using two single beaded bolts to brace a cavity.

No. 2.—Cross section of cavity showing manner of using single beaded bolt and placing nails when there is little or no under cutting.

No. 4.—Oval washer, best kind to use, showing proper method of countersinking and bolting.

NO. 5.—SAME AS NO. 2 FILLED WITH CEMENT.

PLATE NO. 4.—VIEWS OF EXCAVATED, BOLTED AND CEMENTED CAVITIES.

TREATMENT OF CAVITIES.

During the last few years there has been a widespread popular interest in the treatment of decayed places in old trees. This type of work can be regarded as comprising three essential operations: (1) Removing all decayed and diseased matter, (2) sterilizing and waterproofing all cut surfaces, and (3) filling the cavity in a manner that will favor rapid healing and exclude rot-producing organisms.

The necessary tools for digging out decayed matter are few. As a rule, two

outside-ground socket-handled gouges (one with a curved cutting edge of about three-fourths of an inch and the other, perhaps, one and one-half inches), a chisel, a mallet, a knife, and an oilstone are sufficient for ordinary work. The gouges, chisel, and knife should never be used near the cambium when they lack a keen edge, as dull tools will injure it. In cutting out deep cavities, longer interchangeable handles for the gouges may be necessary.

EXCAVATING.

Usually an old decayed spot may be partially or wholly covered by a new growth of wood and bark at the edges and the visible decayed area be small as compared with that which is hidden (Plate No. 1, figures 4 and 6). In such cases it is usually necessary to enlarge the opening with the gouges and mallet in order to make sufficient room in which to use the gouges in the interior. This opening should be sufficiently long to reach all the decayed and diseased heartwood with little or no additional injury to the tree.

If the decayed and diseased wood extends some distance above or below the external opening, it is a common practice to cut one or more holes above or below the main opening in order to facilitate the removal of the diseased wood (Plate No. 3, figure 1). This results in one or more bridges of wood and bark spanning the long interior cavity. This practice is of doubtful value, partly because it is often impossible to see whether the diseased wood has been entirely removed from the under side of the bridges, but mainly because there is a strong tendency in most trees for the bark and sapwood of the bridges to die and decay as a result of severing the sap-conducting tubes both above and below. If the holes are pointed above and below, there is less trouble from this source. A practice that permits a more thorough cleaning out of the cavity is to make a narrow opening, pointed at both ends and sufficiently long to include all the diseased wood. This often extends some distance above and below the visible discolored area.

The most important feature of this stage of the work is to remove all the diseased and insect-eaten wood (Plate No. 3, figures 2 and 3). This excavating must continue on all sides of the cavity until sound, uninfected wood is reached (Plate No. 1, figure 4). All discolored or water-soaked heartwood should be removed, as this is the region in which the rot-producing fungus is most active. In decayed areas of many years' standing there may be only a thin shell of uninfected wood around the cavity (Plate No. 1, figure 6), in which case there is danger of the tree being broken by storms unless braced or guyed.

The bottom and all other parts of the cavity should be so shaped that if water were thrown into the cavity it would promptly run out and none remain in any hollow.

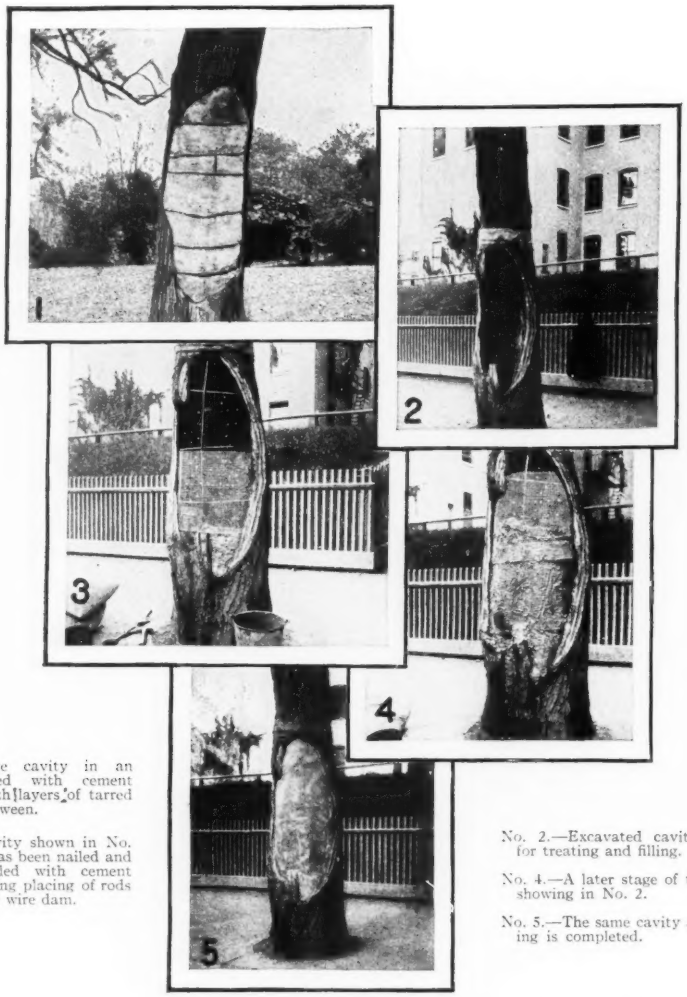
UNDERCUTTING.

Another important point to be borne in mind in shaping a cavity that is to be filled is to have the sides undercut if possible, so as to hold the filling firmly in place. Care must be taken, however, not to have the wood at the edges of the opening very thin, as this promotes the drying out of the bark and sapwood at these points. Ordinarily the edges should be at least three-fourths of an inch thick; an inch and a half would be better (Plate No. 1, figure 4 and Plate No. 4, figure 1).

Great care must be exercised in working around the cambium, and all cutting tools must be kept very sharp. The final cutting along the edges of the bark and sapwood can usually best be made with a very sharp knife. This cutting must be followed immediately by a coating of shellac, which should cover the edges of both bark and sapwood.

BOLTING.

Before cementing a long cavity it is advisable to place through it one or more bolts, so as to hold the wood and cement more firmly in place. A cavity two feet or less in length will not usually require a bolt, but long cavities, as a general rule, should be bolted every



No. 1.—Large cavity in an Elm filled with cement blocks with layers of tarred paper between.

No. 3.—Cavity shown in No. 2 which has been nailed and partly filled with cement and showing placing of rods and use of wire dam.

No. 2.—Excavated cavity ready for treating and filling.

No. 4.—A later stage of the work showing in No. 2.

No. 5.—The same cavity after filling is completed.

PLATE NO. 5.—CEMENT CAVITY FILLINGS, SHOWING DIFFERENT TYPES AND SUCCESSIVE STAGES.

18 to 24 inches. Oftentimes a single bolt can be placed so as to support both sides (Plate No. 4, figure 2). In certain cavities it may be necessary to place bolts at different angles (Plate No. 4, figure 3). In any case a strip of uninjured cambium at least an inch wide should be left between the edge of the cavity and the bolt. On medium-sized trunks, after deciding where the bolts can most efficiently be placed, a very sharp half-inch bit, sufficiently long to reach through the trunk and cavity, can be used to bore the hole for the bolt. On large, heavy trunks a larger bit should be used. Heavy oval or round iron or steel washers, about three times the diameter of the bolt, should be countersunk into the wood by carefully cutting away the bark at both ends of the hole with a sharp gouge or chisel (Plate No. 4, figures 2, 3 and 4).

All split cavities must be securely bolted, particularly near the upper part. If the split comes from a crotch, all

decayed and diseased wood should be removed from the split and creosote and tar applied, after which it can be bolted just beneath the crotch, so as to close the crack or at least bring the parts back to their normal position in case decayed matter has been excavated from the crack. If the split is a recent one, a washing of creosote only will usually be sufficient before drawing the sides together with bolts. Under certain conditions, particularly in large trees, it may be necessary to use a rope and tackle blocks to pull the limbs together some distance above the crotch, in order to properly close the crack before bolting it.

If the cavity has a comparatively large opening or has little or no undercutting, it is the custom to drive flat-headed wire nails into the wood in the interior in order to hold the cement filling firmly in place. In medium-sized cavities nails two and a half or three inches long are usually driven into the wood for about half their length (Plate No. 4, figure 2).

TREATING.

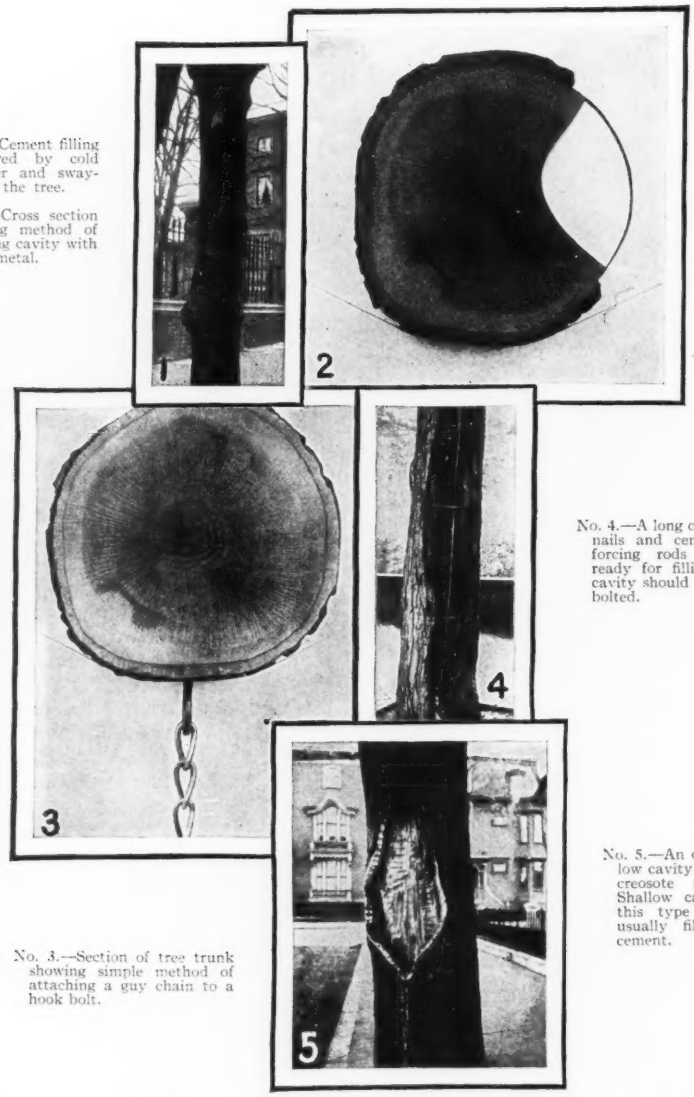
After the decayed and diseased matter has been completely excavated and the edges of the sapwood and bark shellacked, the next step is to sterilize the interior of the cavity in order that all germs of disease or decay which are present may be killed and that any which may come in contact with the cut surfaces during subsequent operations may be destroyed. As already stated, creosote appears to be one of the best preparations to use. Every cut part of the wood and bark must be creosoted, and over this a heavy coating of tar or hot asphalt should be applied before the cavity is filled.

MIXING THE CEMENT.

A good grade of Portland cement and clean, sharp sand free from loam (1 part of cement to 3 or less of sand) should be used. A quantity of dry cement and sand sufficient to fill the cavity should be thoroughly mixed before the requisite amount of water to make a rather stiff mortar is added and the whole mixture worked to an even consistency. In large cavities fine gravel free from loam is sometimes substituted for the sand.

CEMENTING.

For placing the mixture in the cavity a mason's flat trowel and an ordinary garden trowel with a curved blade will be found convenient. A tamping stick, 1 or 2 inches thick and 1 to 3 feet long, according to the size of the cavity, will be needed; also some rocks and a pail of water if the cavity is a large one. A layer of cement 2 or 3 inches deep can now be placed in the bottom of the cavity with the garden trowel and tamped firmly in place. This operation is repeated until the cement is 8 to 12 inches thick. Wet rocks of various sizes may be embedded in the cement provided they do not reach within an inch or two of its outer face. If the mixture is too wet, it will tend to run out of the cavity under the operation of tamping. If too little water has been used, it will not pack down promptly. The top of the 8 to 12-inch block of cement is then smoothed with the flat trowel so that it will slant slightly downward from back to front, in order to facilitate drainage. Over the top of this cement block a double or single sheet of tarred roofing (or thinner) paper is placed after it has been cut so as to fit the cavity. On top of this, another block of cement is built as soon as the first block is sufficiently hard to stand the weight and tamping without forcing any of it out at the bottom of the cavity. If the interior of the cavity extends well above the level of the external opening, it may occasionally be necessary to bore or cut a downward slanting hole from the outside to the top of the interior cavity, through which a watery mixture of cement may be poured to fill the upper part of the cavity and the hole. The main opening of the cavity must be completely closed with the stiffer cement before this watery mixture is introduced. When a block of the cement has partially hardened, it will be necessary to carefully smooth the outer surface or cut it down with the flat trowel to the level of the cambium, taking great care that the lat-



No. 1.—Cement filling shattered by cold weather and swaying of the tree.

No. 2.—Cross section showing method of covering cavity with sheet metal.

No. 3.—Section of tree trunk showing simple method of attaching a guy chain to a hook bolt.

No. 4.—A long cavity with nails and cement reinforcing rods in place ready for filling. This cavity should have been bolted.

No. 5.—An open shallow cavity ready for creosote and tar. Shallow cavities of this type are not usually filled with cement.

PLATE NO. 6.—A DAMAGED CEMENT FILLING, TYPES OF UNCEMENTED CAVITIES, AND CROSS SECTION SHOWING METHOD OF ATTACHING A GUY CHAIN.

ter is not injured in the operation (Plate No. 4, figure 5 and plate No. 5, figure 1). If the cement is allowed to become too hard to trim with the trowel, it can still, with more or less difficulty, be cut back to the cambium line with a cold chisel and hammer. It is a rule with most tree surgeons to trim back the outer surface of the cement to an eighth of an inch or more below the cambium and then use a layer of stronger cement (one part of cement to one or two of sand) to raise it to the level of the cambium, after the filling has partially hardened.

The thinner mixtures of cement will set more firmly. If any mixtures thinner than the one already mentioned are

used to fill a cavity, some sort of cloth or wire dam will have to be used to hold the cement in place until it is hard. For this purpose strips of burlap wrapped tightly around the tree so as to cover the lower part of the opening may be sufficient if the mixture is not very thin; otherwise, a more closely woven fabric, such as canvas or carpet, may be used.

After the cement filling has become thoroughly dry, the outer face may be painted with coal tar or paint, especially around the edges where cracks are likely to appear. This should not be done for several weeks after the cement has been put into the cavity.

TINNED CAVITIES.

Sheet tin, zinc, and iron have been quite extensively used to cover cavities. When properly applied, these coverings often serve to keep out disease and insects for a long time. Oftentimes they are improperly applied, or the cavity is not properly treated. Under such conditions these tin-covered cavities are a greater menace to the tree than open cavities. In preparing a cavity for a sheet-metal covering, all the decayed, diseased and insect-eaten wood is removed in the manner indicated under cement fillings, with two exceptions: There is no need of undercutting the cavity and there should be a narrow half-inch ledge of wood around the edge of the cavity to which the margin of the sheet metal can be tacked. The excavated cavity must be thoroughly

No. 1.—Limbs of an Elm tree guyed by several independent chains 15 feet above the crotches. PLATE No. 7.

No. 2.—A split crotch guyed by means of a long bolt about eighteen inches above the crotch.

No. 3.—A tupelo tree nearly strangled by telegraph wires wrapped around the trunk.

sterilized and waterproofed. The sheet metal should be trimmed so that its edges will exactly fit along the edges of the bark. The metal can then be placed on a block of wood and holes an inch or less apart punched or drilled along its margin, through which long, slender, flat-headed brads may be driven into the ledge of wood around the cavity. The edges of the cavity and the inner side of the metal should now be freshly tarred. The metal is then put in place and nailed with a light hammer, allowing the center of the metal to curve outward, so as to conform to the general shape of the trunk (Plate No. 6, figure 2).

In a tree which is not considered of sufficient value to warrant cleaning and filling the decayed areas or covering them with tin, these may be excavated, sterilized, and waterproofed (Plate No. 6, figure 5). In this condition they can often be safely left for years if the waterproof covering is renewed as soon as cracks or blisters appear.

THE TIME FOR SURGERY.

As a general rule, tree surgery can be safely undertaken at almost any time of the year when the sap is not running too actively and the weather is not cold enough to freeze the cement. In most trees the sap will interfere with the work only from the time the buds begin to expand in the spring until the leaves are full grown. Cement work will be ruined if it is frozen before it is hard. It is not likely to be injured by frost after it has been drying for a week.

TREES WORTH REPAIRING.

Most ornamental and shade trees having only a few dead limbs are unquestionably worth attention. Others which have many dead limbs or numerous decayed areas may not be worth the expense, particularly if they are naturally rapid-growing, short-lived trees. No one can decide better than the owner of a tree whether it is worth the attempt to save it, because usually the actual commercial value of an ornamental or shade tree has little or nothing to do with the decision. It is generally a question merely of esthetic value, or historic associations, or rarity of the species. A man who has had experience in repairing mutilated or diseased trees may be able to say definitely whether it is possible to save the tree, but the owner, who pays the bill, is the one who will have to decide whether the tree is worth the price it will take to repair it. Often the owner will realize a greater degree of satisfaction by having a badly diseased or mutilated tree replaced. In expert hands the moving of large trees is no longer a hazardous undertaking.

STUDYING THE LUMBER INDUSTRY

WORK has been commenced by the Forest Service and the Department of Commerce in the scientific study of the lumber industry for the purpose of developing the economic facts concerning the industry and placing them before the public in a fair and impartial manner. The lumber manufacturers have very generally signified their willingness to cooperate in furnishing the representatives of the departments named the information which will aid them in this work.

Chief Forester Graves, of the Forest Service, indicates the fair and open-minded basis on which this study is to be conducted in saying:

"It is my purpose to set the facts ascertained before the public, necessarily from the point of view of the interests of the people at large, but with absolute impartiality and fairness to the industry. I propose to make the

inquiry not only impartial but constructive and helpful in dealing with the problems of the industry as far as I am able to do so. I shall want to obtain the judgment of members of the industry on the conclusions indicated by the study before they are put in final form."

As the report to be eventually issued will deal with the costs of lumber production, the effect of taxation upon timber cutting, the possible utilization of material now wasted, and other practical phases of lumbering operations, it is obvious that a comprehensive study, based upon such facts, will be of as much benefit to the lumber industry itself as to the public in general.

The Forest Service announces the following assignments of its men in connection with this work:

F. H. Smith and R. S. Simmons, now engaged in a study of foreign markets, are carried on the rolls of the Bureau of Foreign and Domestic Commerce. E. S. Bryant and R. S. Bryant, carried on the rolls of the Forest Service, are investigating the conditions controlling lumber production in the southern yellow pine region. Austin Cary, with the assistance of members of District 6, is conducting a similar investigation in the Pacific Northwest. C. Stowell Smith, with the assistance of the officers in District 5, is conducting an investigation of conditions controlling lumber production in California. F. A. Silcox, with the assistance of the members of District 1, is conducting a similar investigation in the Inland Empire.

The Forest Products Laboratory, under the direction of Howard F. Weiss, is supplementing these investigations by studies of utilization and waste.

The Office of Industrial Investigation, under the direction of O. T. Swan, is conducting studies of the adaptation of manufacturing and grading to wood using industries and markets.

Other members of the Forest Service within the next two months will undertake studies of special phases of lumber distribution.

WEST VIRGINIA FIRE PROTECTION

THE Executive Committee of the Central West Virginia Fire Protective Association has arranged to cooperate with the State and Federal Government in preventing and controlling forest fires and has appointed several patrolmen.

This association, which was organized several months ago for the purpose of supplementing the State and Government in forest fire work, is composed of all the principal timber land owners in central and southeastern West Virginia, the largest of whom are the Cherry River Boom & Lumber Company, with 210,000 acres, the Gauley Land Association with 175,000 acres, the West Virginia Pulp & Paper Company with 150,000 acres. Other members are the Babcock Lumber Company, George Craig & Sons; Bemis Lumber Company; Raine-Andrews Lumber Company; Wildell Lumber Company; Wilson Lumber Company, Gilfilin, Neal & Company; Pocahontas Land & Development Company; Denmar Lumber Company, Glady Fork Lumber Company, Porterwood Lumber Company and William's Heirs.

All this land belonging to the Association, comprising more than 800,000 acres, is assessed annually at 1 cent per acre, which will be used in cooperating with the State and Government in better protecting these forest lands from fire.

The State builds and equips lookout stations on high mountain peaks, the Government furnishes lookout watchmen for these stations and the private owners, through this Association, furnish patrolmen, which makes a complete system as is now being used in the following sixteen states: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, New Jersey, Maryland, Kentucky, Michigan, Wisconsin, Idaho, Minnesota, Washington, Oregon and South Dakota.

A FIRE PLACE FOR THE WOODS.

THIS IS MADE OF STONES AND IS ONE OF A VARIETY OF FIRE-PLACES ADVOCATED BY CAREFUL WOODSMEN.

A SAFE CAMP FIRE-PLACE

THERE are almost as many ways to start a camp fire as there are campers. Many prefer what is known as the "tepee" or "wigwam" style, in which a pyramid is built with fine twigs on which are superimposed others that are progressively larger until they are full size. Others use on either side of a fire-place two green sticks as supports, and "lay" the fire as with andirons.

But whatever the method of starting there is only one way that is safe, as far as prevention of forest fires is concerned. Such a safe fire is never built against a fallen log or near a tree. The ground is carefully cleared of inflammable duff and rubbish. The picture presented herewith shows the right kind of a place for a camp fire in the woods. The large flat rocks at the sides will support coffee pots or cooking utensils; and the built-up back will serve to reflect heat if the fire is built for warmth or good cheer.

This fire-place puts such definite limits on the blaze, that when the time comes for quitting camp, a little water and some shovelfuls of mineral soil will effectually extinguish the blaze and prevent the spread of fire to the woods.

A fire-place of this type can be more elaborate and pretentious, of course, but its essential features of safety and convenience can not be much improved.

Such a fire-place is available for use from one camping party to another. Before being used, however, all the accumulated debris should be carefully cleared away.

Stones are in no way essential. On the Florida National Forest, for example, where the soil is a fine sand, one camper asserted that the largest stone he found was in a can of baked beans. In such a place a hole scraped in the sand, with the pine needles and debris raked away, makes an adequate and safe fire-place. Similar conditions elsewhere can be satisfactorily met by making a hollow in the earth; then when the fire is left it can be effectually extinguished by heaping upon it the earth removed from the excavation.

A WHITE MOUNTAIN PURCHASE

GREATLY to the delight of New Englanders who have for some years advocated the purchase by the Government of areas in the White Mountains which include points of particular scenic value and interest, the National Forest Reservation Commission during September approved the purchase of 85,000 acres of White Mountain forest lands which include Mt. Washington, Mt. Adams and Mt. Jefferson. These mountains, famous for their rugged beauty and very popular as health and summer resorts, furnish what is regarded as the keystone or hub of the White Mountain drainage system and the members of the commission feel that the purchase is one of the most important that has been made.

For the past three years there have been almost constant negotiations for these lands and at times New Englanders, who advocated the purchase and were very anxious to have the Government take them over before more timber was cut by private owners, felt that the commission was not giving the matter the attention it deserved. Consequently they are elated by the successful outcome of the negotiations.

The lands approved for purchase include two principal tracts: The first comprises three State grants known as the Thompson and Meserve purchase, Sargent purchase, and Hadley purchase, making in all 33,970 acres; the second tract includes portions of the towns of Albany and Bartlett, amounting to 45,170 acres. The two tracts belonged to the same company and were purchased at $8.50 an acre.

The bulk of these lands were first offered to the Government three years ago at a price of $28.60 an acre. The Forest Service, which is charged with the examination of such lands, held that the price was too high, and declined to recommend the purchase, in spite of the fact that a large amount of public sentiment had developed in its favor. Within the past year a very careful estimate was made of the standing timber on both tracts, and as a result of this estimate the Forest Service was finally able to secure the offer of the land at a price which was felt to justify its purchase.

Portions of the land contain very dense and valuable stands of timber. That in what is known as the Great Gulf, lying on the north side of Mt. Washington, between that mountain and Mts. Jefferson and Adams, consists of an unusually heavy stand of spruce. This area is prominently in view from all the surrounding mountains and it has been constantly brought to the attention of the commission that a large part of the public desired that the land might pass into the hands of the Government. Altogether, these two tracts contain about seventy million feet of spruce and fir timber, in addition to considerable quantities of hardwoods, mainly beech, birch, and maple.

Another tract in which the public was deeply interested is a body of land of 5,600 acres situated on the south slope of Mt. Passaconaway and on the east slope of Mt. Whiteface. This tract lies immediately above the village of Wonalancet, a favorite New England summering place, and also contains a valuable body of timber. On this tract there are 800 acres of virgin spruce, containing about 15,000 feet to the acre. This again is one of the virgin tracts which public opinion has strongly favored the Government's owning.

Two other tracts of smaller size make up the purchase. Altogether they bring the Government purchase in the White Mountains up to 220,000 acres, or nearly one-third of the region covered by this mountain system.

GENERAL VIEW OF MT. WASHINGTON AND MT. JEFFERSON.

THESE TWO MOUNTAINS ARE INCLUDED IN THE PURCHASE RECENTLY APPROVED BY THE NATIONAL FOREST RESERVATION COMMISSION. MT. BOWMAN VALLEY IS IN THE FOREGROUND.

WHAT IS A NATIONAL FOREST?

By T. W. VENEMANN.

SO MUCH discussion and comment has been published in recent years relative to federal control and administration of the National Forests that there are comparatively few people in the United States today who do not have some knowledge, at least, of the existence, location, and purposes of these forests. While it is pretty generally understood that they are large bodies of mountainous, timbered lands controlled by the government for the purpose of protecting and preserving the resources of the forests, there are many persons who have but a very vague idea of what constitutes a National Forest, or, in other words, what is its physical make up and appearance.

Probably the general impression held by many who have never seen or had any business dealings on them is, that they are immense bodies of heavy timber stretching for miles and miles along the mountain slopes, for the most part uninhabitable and undeveloped. This impression although erroneous is quite natural for the reason that the name National Forest itself implies large bodies of timber, while in the general presentation of forestry topics they are usually referred to collectively, or as individual forest units. It would be surprising to many, then, to know how much similarity actually exists between the developments on the National Forests and those in other parts of the states in which they are located.

If the reader will examine a map of Colorado, he will notice that, although the entire western half of the state is traversed by heavy mountain ranges, towns and settlements are as thickly scattered throughout this section as on the more open and level portions of the state. This fact is significant for the reason that these same mountains are also occupied by fourteen and a half

PLACER MINING.

THIS OPERATION IS NEAR HABINS PEAK ON THE ROUTT NATIONAL FOREST IN COLORADO AND SHOWS HOW SECTIONS OF NATIONAL FORESTS ARE USED AS MINING CLAIMS.

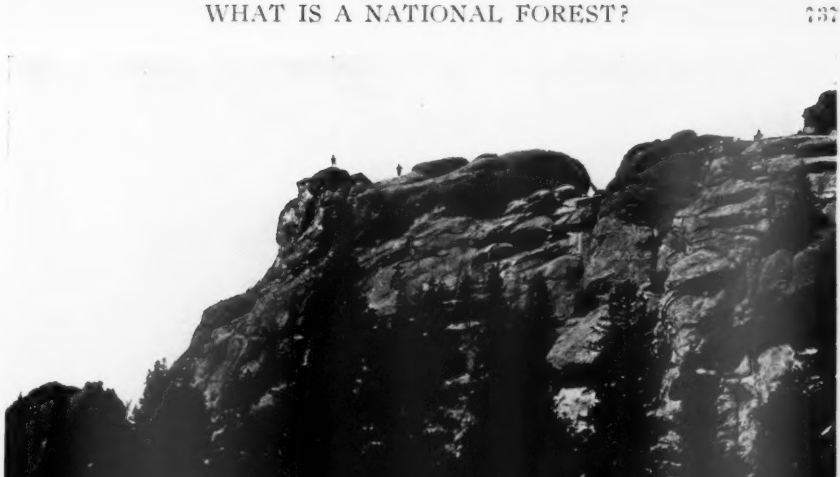
million acres of National Forests, proving at the outset that these forested areas are not huge bodies of uninhabitable and undeveloped timberlands. While it is true that some of them contain large stands of dense and inaccessible timber, other portions are more thinly wooded, on which the timber is held primarily for the protection of the water supply without which the surrounding country would be uninhabitable. The greatest development is found within these more sparcely wooded regions. Many of these developments existed long before the forests were set aside and, of course, were excluded from the actual Forest boundaries. When the Forests were created they were made to include only unappropriated public lands and, at the same time, to exclude as far as practicable, any considerable bodies of land having a greater value for other than forestry purposes. These factors are largely responsible for the irregular shape of their outer boundaries. This same broken up condition also exists within the Forests as will be seen later.

CASCADE CANON AND RAMONA HOTEL.

A SUMMER RESORT ON PATENTED LANDS WITHIN THE PIKE NATIONAL FOREST IN COLORADO.

In Colorado there are seventeen separate and distinct National Forests, one of the largest and most important of which is the Pike. This Forest alone occupies a gross area of 1,323,000 acres, on the eastern slope of the Rocky Mountains, and practically in the center of the state. Primarily the Pike is what is known to foresters as a protection forest. That is, the forest cover is held mainly for the protection and conservation of the water supply furnished by countless streams originating within the Forest. How much is dependent upon the protection of this forest cover may be realized when it is known that such municipalities as Denver, Colorado Springs, Cripple Creek, Idaho Springs, Golden, Central City, Georgetown, Boulder, and scores of other smaller settlements on and adjacent to the Pike are almost wholly dependent, for their domestic water supplies, upon streams arising in or flowing through this Forest. Not only is this true as regards domestic water supplies, but hundreds of thousands of acres of agricultural lands within and without the forest boundaries are irrigated through the same sources.

It is impossible to tell in a single article all of the developments on the



DEVIL'S HEAD FIRE LOOKOUT STATION.

ON THIS HIGH, BOLD ROCKY PEAK A FOREST FIRE PATROL IS ABLE TO WATCH OVER MANY MILES OF FOREST AND TO QUICKLY DISCOVER ANY FIRE WITHIN RANGE OF HIS TELESCOPE.

Pike Forest. For instance the southeastern wing of this Forest and adjacent territory, involves a total area of 1,260 square miles, or thirty-five townships.

Near the upper edge are Cheeseman Lake and Dam, which together with the South Platte River, form the most important factors in the water supply system of Denver. Near the base are Pikes Peak and the municipalities, Colorado Springs, Colorado City, Manitou, and Cripple Creek, dependent upon its watershed. Three of the nine railroads crossing the Pike Forest are in this section, together with the famous "cog road" running between Manitou and the summit of Pikes Peak. One of these is the Colorado Springs and Cripple Creek route, considered among the finest and most popular scenic mountain trips in America. A few miles west of Colorado Springs and crossing a portion of the Forest is the wonderful "High Line Drive," an automobile thoroughfare built along the crest of the mountains and revealing to the tourist a magnificent view of mountains and plains for miles around. In addition to these routes of travel there is the Ute Pass road, forming part of the state and transcontinental highway between Colorado Springs and Leadville, built by convict labor, together with the elaborate system of roads and trails crossing the Forest in all directions.

Included in the Pikes Peak region, within and adjoining the Forest, are many of the most wonderful nature freaks in the Rocky Mountains. The Garden of the Gods, Glen Eyrie, with its reproduction of the Cliff Dwelling, the historic Ute Pass, Cheyenne Canyons, Cave of the Winds, Seven Falls, Crystal Park, Mount Manitou incline railway, and scores of other scenic attractions drawing thousands of tourists from all parts of the country to that section. It is estimated that fully half a million sightseers visit this portion of the Pike Forest every summer.

Following the lines of railroad are numerous towns and settlements, while scattered throughout the Forest are hundreds of summer and year-long residences, stores, hotels, schools, and

other improvements for the convenience of tourists and permanent residents.

Near Clyde is the Rathke elk preserve, leased from the government for the protection of a band of these rapidly diminishing animals. The Colorado Springs Fly Casting Club has its fishing resort on Beaver Creek, a few miles west of Palmer Lake. At Palmer Lake, adjoining the eastern border of the Forest, and dependent upon the Forest for many of its recreative features, is one of the most attractive mountain resorts in the state. Nestled in the timber on the slope of the mountain are many beautiful summer cottages readily seen from the cars of the two railroads passing close by. On the eastern border of the Forest, near Monument, the Forest Service maintains one of the largest forest nurseries in the country, supplying annually hundreds of thousands of young trees for restocking denuded areas within the National Forests. Two miles west of Manitou, on the slopes of Pikes Peak, is situated the Fremont Experiment Station, where extensive forest investigations are being conducted by the Forest Service to determine how best to reproduce, develop, and manage the forests of the Rocky Mountain region.

In order to facilitate the transaction of business the Pike is divided into eleven ranger districts, each provided with a ranger headquarters. Where such headquarters are not more conveniently located in nearby business centers, they are established on the Forest, consisting of dwellings, barns, outbuildings, pastures, and a small patch of agricultural land to supply food and provender for the ranger, his family and livestock.

A National Forest Operation.

A LUMBERING SCENE ON THE PIKE NATIONAL FOREST IN COLORADO.

The most destructive agency on the National Forests today is fire, which annually destroys millions of dollars worth of public property. In order to reduce this loss to a minimum the Forest Service during the last ten years has built up on the Forests a vast network of roads, trails, and telephone lines, established fire lookout stations on prominent mountain peaks, and placed throughout the Forests thousands of tool caches containing fire-

fighting equipment. Probably the most unique fire lookout station in existence is located on the summit of Devil's Head, a rocky peak lifting its head ten thousand feet above sea level. From this pinnacle the lookout man, stationed there during the summer months, commands a view of three-fourths of the entire Forest, or more than a million acres of valuable timber. Located on the very summit is a telephone, while at the base of the huge rocks that crown the mountain a camp is established for the lookout. A small cabin is also built on the summit of the peak to house the telephone and to shelter the lookout in case of storm. On the topmost rock, with a sheer fall of one thousand feet on three sides, a table containing a map of the Forest is bolted into the solid granite, by the aid of which the fire lookout is able to locate any fires arising on that portion of the forest within view of the station. He can then communicate by telephone with the office of the Forest Supervisor at Denver, thirty miles distant in an air line. This, itself, is a remarkable illustration of how modern developments may be found in supposedly inaccessible regions.

All land within the boundaries of the National Forests is not government land. In order to explain the broken up condition within the Forests take for instance a single township in the Pike National Forest, a portion of the township is alienated from the Pike Forest and comprises state and private lands following the line of the Colorado and Midland Railroad, many of which were purchased from the government before the creation of the Forest. Those that were not so purchased are for the most part patented homesteads.

This is typical of the condition existing to greater or less extent throughout all of the National Forests. Hundreds of streams flowing through the Forest are studded on either side with agricultural homesteads; in countless small draws and ravines, in open parks, and in fact wherever lands are capable of producing crops and are more valuable for that than for forestry purposes, they are open to homestead entry. These alienations apply not only

A Forest Homestead.

THE RESIDENCE, BARNS AND OTHER BUILDINGS OF A PROSPEROUS HOMESTEADER ON A NATIONAL FOREST.

to agricultural but to mineral lands as well. Thousands of patented and unpatented mineral claims are located throughout the National Forests. At Nederland, Colorado, on the Pike, are located the largest tungsten mines in the world, while also on this Forest, near Central City, are the only mines producing pure uranium in the country.

The most important enterprises on the National Forests, producing a revenue to the government, are the grazing and timber sale industries. Scattered throughout the Forests are thousands of acres of open park and non-timbered lands having no value for agricultural crops, on which the Forest Service annually feeds millions of head of livestock, the products of which go to supply the demands for meat, hides, and wool in every state in the Union.

Next in importance to the protection of the forest cover, it is the object of the Forest Service to dispose of its mature and dead timber through scientific forestry methods, thereby accelerating the young growth and increasing the productive capacity of the Forests. Located on the National Forests, therefore, are hundreds of sawmills, wood pulp and other wood using industries, annually consuming millions of feet of timber.

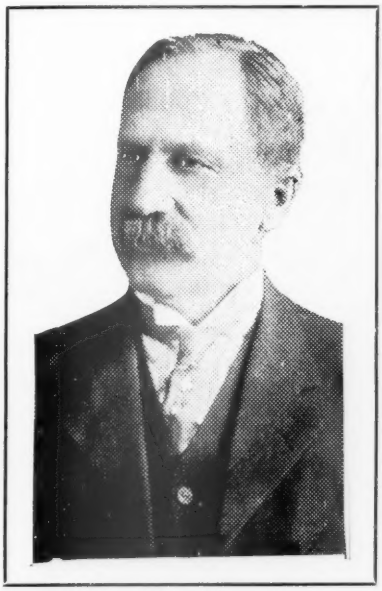
It may readily be seen from these few illustrations that development is not lacking on the National Forests nor does it differ materially from that outside the Forest boundaries. The fullest development both within and without the Forests is actively sought by the government for the mutual benefit and protection of the resources of the entire region. The forest timber, its water, minerals, game, and every other resource is available for use by the general public, and the government is endeavoring to make them an everlasting heritage.

BERKS COUNTY CONSERVATION

BERKS COUNTY, PA., has set the pace for all other counties of that State and every other State, in the organization of a county conservation association, which was effected on September 12. A number of foresighted men, realizing the necessity of preserving the scenic beauty as well as the natural resources of the county, started the movement which is to enlist the aid of all the residents and is certain to do a great deal of good. The association will devote its work to the preservation of the forested lands of the county in public parks and on public and private lands, to forest fire prevention, placing the smallest practicable tax on timberlands, conserving the water supply, protecting wild life in forest and stream, and inspiring a love of natural scenery. Among the features of the proposed work will be the saving of Mt. Penn and Neversink which

THE PAGODA.

On Mt. Penn, Pennsylvania, where the Berks County Conservation Association was organized September 12.



JONATHON MOULD.
PRESIDENT BERKS COUNTY CONSERVATION ASSOCIATION.

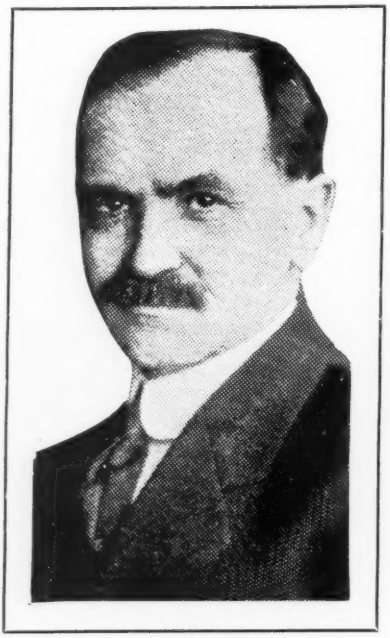
overlook the city of Reading, and which have been marred by the lumberman and the quarryman.

The organization was effected at an enthusiastic meeting at The Pagoda on Mt. Penn, recently turned over to the city by its owner, Mr. Jonathon Mould. There gathered, as a result of excellent preliminary arrangements by the several men who started the movement, a large number of men and women eager to aid in the good work. Mr. Mould presided and addresses on forestry and general conservation were made by Dr. Henry S. Drinker, president of Lehigh University and president of the American Forestry Association; Dr. J. T. Rothrock, vice-president American Forestry Association; Hon. S. B. Elliott, Forestry Commission of Pennsylvania; Irvin C. Williams, Deputy Commissioner of Forestry; A. B. Farquhar, president Pennsylvania Conservation Association; John Birkinbine, president Pennsylvania Forestry Association; Joseph Kalbfus, secretary Pennsylvania

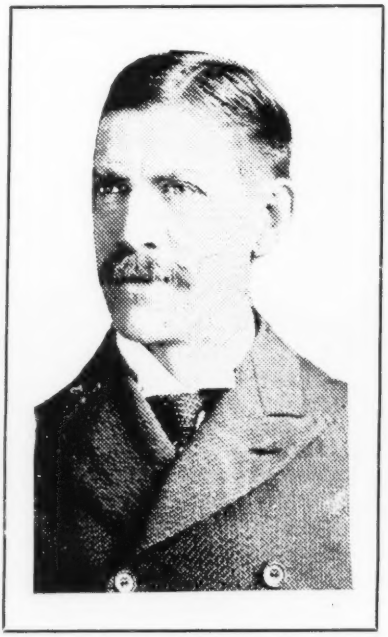
SOLAN L. PARKES.
EXECUTIVE SECRETARY BERKS COUNTY CONSERVATION ASSOCIATION.

Game Commission; George W. Kehr, secretary Pennsylvania Conservation Association; Mayor Ira W. Sutton, of Reading; B. Frank Ruth, park superintendent, of Reading; Daniel K. Hoch,

JOHN K. STAUFFER.
Editor "The Forester" 1899-1900. Washington newspaper correspondent, 1900-1914. Now member and secretary of Reading City Planning Commission and chairman Advisory Committee of Berks County Conservation Association.



DANIEL K. HOCH.
TREASURER BERKS COUNTY CONSERVATION ASSOCIATION.



WM. H. LUDEN.
ADVISORY BOARD MEMBER BERKS COUNTY CONSERVATION ASSOCIATION.

county controller; John Keim Stauffer, secretary of the Reading City Planning Commission, and others.

The officers elected were Jonathon Mould, president; Solan L. Parkes, executive secretary; Daniel K. Hoch, treasurer; Hon. Ira W. Stratton, first vice-president. The burgesses of the boroughs of Berks County were all made vice-presidents. Headquarters are to be opened shortly and an aggressive conservation campaign started.

An interesting feature of the gathering was the fact that John K. Stauffer, chairman of the advisory committee and one of the most active of the promoters of the association, was a number of years ago editor and publisher of AMERCAN FORESTRY and has ever since maintained his deep interest in forestry. As indicating this he has secured the title to a large section of forested land on Mt. Penn overlooking Reading and he will make out of it a model forest, conducted by scientific foresters, and designated for the use of the people of Berks County. This will not only preserve the natural beauty of that side of Mt. Penn but be an object lesson in forest preservation which should set an example for other owners of forested land in that section of the State. Members of the Conservation Association are elated over Mr. Stauffer's decision.

In Mr. Jonathon Mould the association possesses a president who, having retired from active business, will devote much of his energy to the work and in Solan L. Parkes he will find a most energetic and hard-working assistant. The success of the association appears to be already assured.

JUNIOR CLASS PHILIPPINE FOREST SCHOOL.

THE CLASS OF 1915 IS COMPOSED OF 13 HIGH SCHOOL GRADUATES, 3 FOURTH-YEAR STUDENTS, 4 THIRD-YEAR STUDENTS WHILE THE 1916 CLASS JUST ENTERING THE FOREST SCHOOL HAS 169 HIGH SCHOOL GRADUATES, 2 FOURTH-YEAR STUDENTS, AND 4 THIRD-YEAR STUDENTS.

FILIPINO FORESTERS

GRATIFYING progress is being made in instructing Filipinos in forestry at the forestry school established by the Bureau of Forestry at Manila, under the direction of Major George P. Ahearn, and particularly good results are expected of the junior class, which recently returned from its summer camp on Mt. Maquiling, where much practical work was done and considerable valuable information of forest conditions secured.

General Inspector J. R. Barber, in reporting to Major Ahearn about the camp, says:

"The members of the faculty connected with the camping scheme are to be congratulated upon its success. From what I observed, I believe the students were distinctly benefited by the experience obtained. The permanent camp, two rather inadequate snapshots of which are attached, was excellently located on the northern side of Mt. Maquiling about 16 or 17 kilometers from the Forest School. Absolutely all work in and about the camp such as cooking, washing dishes, cleaning up, gathering firewood, etc., was performed by the students.

"During the period of the encampment the students received practical instruction in all branches of the field work which is conducted by the bureau. In accordance with your expressed wish the undersigned gave particular attention to the manner in which the students conducted themselves with reference to cooking, packing, camping and their general adaptability to field life. I was very well pleased, indeed, with what I found. They were cheerful, happy and willing during the hike, even though it was decidedly uncomfortable for them on two occasions, when heavy rains were encountered. Each student carried all of his own equipment, including bedding roll and mosquito bar as may be seen by the third attached snapshot. I believe each and every student in the class to be quite capable of looking out for him-

self satisfactorily in the field. They are on the whole a pretty husky bunch of boys and I am inclined to the opinion that they are the best material, as a class, we have yet had at the school, and good results may confidently be expected from them upon their graduation and taking up active service in the Bureau."

Major Ahearn, in writing to AMERICAN FORESTRY about the school and its success, says:

"The forest school was started early in 1910 as part of the College of Agriculture, University of the Philippines. The college and school are situated near Los Baños at the base of Mount Maquiling, some 42 miles from Manila, being connected with the same by excellent rail and water transportation. This section of the country is building up fast as is evidenced by three recently constructed railroad lines now girding the mountain. Mount Maquiling is 3,800 feet in elevation and, being almost wholly forested, was set aside as a reserve as soon as the school was established. The area of the reserve approximates 15,000 acres. The study and mapping of this reserve, together with constructive work such as road and trail building, tree planting, etc., is part of the work of the students, and in addition each class is expected to improve one hectare (two and a half acres) of the reserve, making a sort of a model forest on a small scale which will be left as a monument to the class doing the work.

"The students are given a practical training, namely, to estimate roughly the character, extent and value of a given area, to locate and build trails, keep licensees up to the rules, apprehend and prosecute trespassers and become acquainted with the land status of each occupant within the forest zone. The training in wood technology and forest botany is exceptionally thorough, as it must be in order to be of practical use, for in the average small district under a ranger will be found many hundreds of tree species, the woods of which in some cases grade into each other almost imperceptibly. We now have in the Philippine herbarium specimens of more than 2,500 tree species. During their course the students are made more or less familiar with the operations of the large lumber companies, and are also encouraged to visit the various woodworking industries in and about Manila.

"The cottages used by the students and the faculty are built by the Bureau; the grounds are prettily parked and kept in perfect order; military discipline is the rule and includes daily inspection of houses and grounds.

"The rough outdoor work of the boys keeps them in fine physical trim, so that when they leave for their stations at graduation they present a far more robust appearance than when they entered two years before. They have their societies, including a musical club, and also help to run a magazine, thus fully taking up their time. The headquarters of the model forest district (No. 5) is at the school, and this brings the students into frequent contact with live questions of administration and investigation.

"Opportunity is given the graduates, who are also high school graduates, to return to the school for the course leading to the degree of Bachelor of Science in Forestry. Students are selected from all over the Islands and upon graduation are sent to provinces other than their own. After four years' service they will return to their home provinces, where they can do good missionary work in arousing public sentiment in favor of forest conservation, for without the active cooperation of the public at large, forest laws and regulations are of no avail."

FORESTS, LUMBER AND CONSUMER

By E. T. ALLEN

Forester for Western Forestry and Conservation Association

THE business of supplying us with the products of the forest is one of our three or four greatest American industries. It is our greatest manufacturing industry. Consequently all others are largely dependent upon it. It employs more men, supports more families, than any other manufacture. Lumber is made by labor and its cost is in payrolls, returning to the consumer, whatever his vocation. Government statistics show that in my own great lumbering region, the Pacific northwest, 85 per cent of the price the mills receive have already gone to the community in costs. It probably surpasses every other industry of importance in smallness of profit. In individual cases, unusual opportunity has built large fortunes, but for every one of these are many cases where the public has profited by failure. Also there have been temporary or local situations where one branch of the industry has profited at the expense of another. But on the whole lumber does not cost the consumer as much more than the actual cost of producing it as do most other commodities. Few, if any, things are sold at so much less than their intrinsic value as the trees of which lumber is made. It is essentially a business of service; not one of middleman exploitation, or of fabricating luxuries, or of parasitism in any form. And we, a wood-using and wood-selling nation, depend upon it almost as much as upon food itself.

I wish to emphasize that we cannot consider forestry intelligently until we realize that it is not forests at all, but forest industry, that we seek to perpetuate. The community has little to gain from forests unless it encourages and helps to a sound permanent footing the activities which make them useful and worth preserving. And, conversely, unless it does this, it is not likely to guide or force these activities along lines which do preserve forests. What would be their object? Forests, lumbering and community; community, lumbering and forests—the sequence is inseparable, whether it reads forward or backward, and inseparably it underlies forestry and every forestry problem.

Twenty years ago we had practically nothing, now we have an efficient national forestry administration. Many States have forest laws, some have good ones, a few are fairly liberal with funds. We have forestry associations and congresses. Lumbermen are taking the lead in fire prevention, for in less than ten years the systematic protection of private timber has grown from practically nothing to cover about 100,000,000 acres, with an increase of 3000 per cent in the last five years. But the Forest Service has to fight for existence in every Congress. Many States still have no forest legislation and few legislation that is adequate. In many sections lumberman and public are so mutually suspicious that neither supports any real solution of their common problems. In short, who can claim that there is any recognized American forest policy, existing not because reformers have prevailed on some occasions but because a majority of our population understands what is needed and why, and has insisted upon putting it into effect?

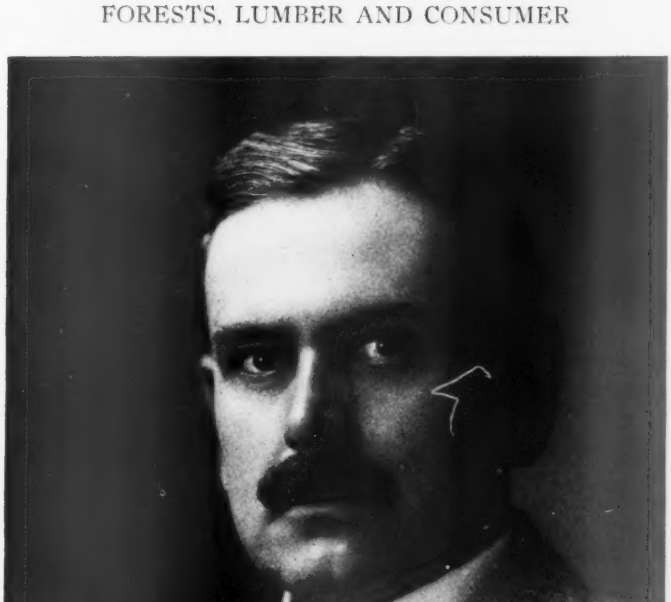
All this is because we have never seen forestry in its practical aspects as we do agriculture, for example. Our average citizen knows when in his town or vicinity, where community relations are so clearly under his eye that they are familiar and clear to him, any industry employs a large part of the population, produces the chief manufactured product, and pays an impor-

tant part of the taxes. Let us say it is dairying, or fruit growing, or furniture making. He concedes its necessity without argument. Citizens and officials alike work for its continuance and development. None would dare do otherwise. If it needs regulation for public good, they do this also. But they know how. If it is a dairy community, its average citizen knows pretty well what production costs, what prices are fair, what improvements are feasible, what the State can and should do to aid or regulate, what public demands are reasonable.

The relation of forests and their management to State and Nation is exactly that of our illustrative industry to our suppositious vicinity, and so is their relation to every citizen. The trouble is that we cannot see it so clearly. The very immensity of the industry causes its several processes of growing, manufacturing and distributing to be conducted separately and thus confuse the public mind. How can we expect our average citizen to see all this when we talk only about forests? We might as well talk only of land when trying to improve agricultural conditions, or water when urging the protection and propagation of food fishes. It is the entire business of their production and use that he must understand; its place in the society under which he exists, the economic laws under which it exists. He must regard it just as he does the production and use of any other necessary crop, obviously to be stabilized on a permanent basis profitable to all concerned. He must realize that its performances and service to the community—supplying the consumer, employing labor, using supplies, and paying taxes—require, like any other industry, three essential conditions: perpetuation of the resource dealt with, economy in every process, and just return for the service rendered. And, whether he is a private citizen or a law maker, to do intelligently his part in formulating an American policy under which such conditions are assured, he must be fairly familiar with the factors which govern lumber prices, logging and manufacturing methods, and the cost of growing and protecting the raw material.

Why is there little trouble in getting laws or appropriations for the advancement of agriculture or horticulture? Not because these industries or their participants are more useful and deserving, but because people understand their governing factors and see the point of such laws. Were forest economics equally understood, a State with a hundred times more revenue to be expected from lumber than from wool would not appropriate $20,000 for coyote scalps and only $500 for forest protection. A community that applauds its chamber of commerce for getting a shoe factory and gives it a free building site would not carelessly burn up a forest capable of employing a thousand times as many men and then tax the owner so he cannot hold and protect the land for a new crop. A State glad to see its farmers get a good price for wheat, even if it does use flour, would not rejoice because its sawmills are forced to sell lumber below cost. A lumberman who prefers to let his trees stand until Americans need them, rather than cut at a loss for foreign export, would not be accused of conspiracy to bleed the consumer any more than is a farmer who does not raise potatoes when they don't pay for raising.

Now a word as to the lumberman himself. The private owner controls most of our forest area. His use of it, our use of it, and the effect of our relations upon our joint use of it, largely determine our forest destinies. Why, if his interest and ours is in the main identical as I have said, does he ever regard forestry as antagonistic or do we incline to regard him as its object of attack rather than as part of it? Is it not just because forestry is too generally made a creed, not a business, and because we have not shown ourselves competent to deal with its business aspects? However gladly we might welcome the improvement of our own various industries and professions, would we be likely to seek it through regulation by lumbermen knowing as little of our trade as we do of theirs?



E. T. ALLEN, FORESTER OF THE WESTERN FORESTRY AND CONSERVATION ASSOCIATION AND PACIFIC COAST REPRESENTATIVE OF THE AMERICAN FORESTRY ASSOCIATION.

Nothing can be more inconsistent, so long as most of our forests are privately owned, and even our public forests must be privately manufactured for us, than to antagonize the lumberman whose help we must have by continuing such ignorance of his problems that we even treat him as an enemy.

Let us, then, see if we can make a brief glance at our tangled forest situation disclose a few points where practical attacks may lead to its eventual clearing up.

We now cut perhaps 50 billion feet of lumber a year for consumption and export, besides billions of lath and shingles, millions of ties and cords of wood, and enormous quanties of poles, mine timbers, cooperage stock, distillate material and other products measured by standards difficult of popular grasp. I hardly know how to put the vastness of this quantity before you in any comprehensible comparison. It would load a train of cars reaching once and a half around the earth at the equator. It would pave a roadway from the earth to the moon, two inches thick and over 30 feet wide. We are cutting each year three times the yearly growth, to say nothing of the loss from fire.

To meet this, we have perhaps 2500 billion feet of standing timber suitable for lumber. We can only guess as to future cutting rate, or loss by fire, or areas which will be permitted to reforest, but 50 years is commonly given as the approximate life of our visible supply. Over half this supply is on the Pacific Coast, less than quarter is in the South, the Lake region has 3½ per cent, and the remaining fifth is scattered outside these three main forest regions. And of the entire supply, less than two-fifths is in various forms

of public ownership, State and Federal, and over three-fifths is in private hands.

There is, however, a vast area of cut and burned-over land, increasing yearly and useless for any other purpose, which might be growing a new crop. On the Pacific Coast alone, which has been called the nation's woodlot because of its combination of favorable climate and rapid-growing species, there are fully 20 million acres of such deforested land which if encouraged to do so should yield 500 billion feet in 60 years. And in the same region the 120 million acres or more of uncut timber, if restocked as cut, would eventually produce as much as we now consume. Adding obtainable reproduction elsewhere in the United States, there is no sound reason why we should not be well provided in perpetuity. The chief thing to fear is that these new crops will not be started soon enough.

Obviously what we want is such inducements as shall effect the use of all this land, cut and uncut, regardless of ownership, with the least waste of existing material, the most certain production of future material, and the lowest prices to consumer for which such supply of his needs can be assured. Older countries have learned the futility of expecting this without sincere community support and the removal of prohibitory conditions. Having accorded these, they are in position to require the industry to reciprocate. It would reciprocate even more gladly here, for it has more involved. Our attitude, however, is either of complete indifference or that forestry is to be spread by the sword, with occasional defensive fortresses of public forests. Even these many of us regard less as business institutions than as points from which to shout defiance and expect reprisal. Surely we also should be intelligent enough to evolve a policy which considers both private and public forestry in their joint relations and from the viewpoint of permanent industrial development. If so, what are the conditions to be met?

Whatever may have been conditions in the past; when timberland was cheap, market near at hand, and carrying costs negligible; great financial opportunity in standing timber no longer exists. Taxes, protection cost and interest on the investment are now compounding far more rapidly than prices can be advanced. Apparently home consumption cannot use all our vast stored supply until carrying costs have exceeded what the material is worth to the consumer. Realization of this is making the tendency sharply toward competitive overproduction, not toward monopolistic holding back of material. Unfortunately, however, this does not benefit the consumer. The mill accepts less, but the ultimate retailer does not sell for less. Differences are absorbed enroute. The producer always gets the least that he can possibly take and the consumer pays the most he can possibly pay. The net result of low mill prices to the consumer is wasteful cutting and forced foreign export, to hasten the day when his question will be not what he must pay for a board but whether he can get a board at all.

Insofar as this situation of the lumberman is due to his own overinvestment, we may not sympathize with him. It is hard for us to say whether he hoped for an unearned increment or thought he was prudently supplying his mills. But it is discouraging to good permanent management and we will suffer with him accordingly. And we are certainly equally short-sighted when we aggravate it more intolerably by continually threatening the timber with a carelessness with fire which has no parallel in the civilized world and by a confiscatory taxation system which has been abandoned by every nation that pretends to a forest policy. Our tax system forces destruction, prohibits conservation, and pays us less than would a rational one.

WHERE IS WASTE?

We talk much of the appalling waste of our forests when cut. The truth is that every portion of the tree that can be taken out of the woods without loss is taken out, and more, for to some extent the higher grades can be made to pay for the loss on lower grades. The reason for this waste is the same

reason for the waste of poorer apples or potatoes which the farmer knows will not pay for hauling—except that when a community wastes food it probably expects enough next year, whereas when it refuses to pay for full utilization of lumber it deliberately shortens its future supply. Lumbermen have been trying for years to save by manufacturing odd lengths, but are about discouraged because the consumer, accustomed to standard lengths, still insists on buying a 16-foot board and cutting it in two himself instead of taking two 8-foot ones. It is also known to all lumbermen and foresters that waste in the woods is almost in exact proportion to the falling off of lumber prices. Instead of cutting less when lumber is low, the operator must cut more in order to get the higher quality which alone can be taken out at any profit, leaving the rest to rot or burn.

Finally, after wisely creating vast national forests to safeguard our future against the shortage all these things portend, we now hear in Congress a demand that their timber be forced on an already demoralized market, so that for a little revenue in the national treasury today we may force further waste and foreign export of our total supply and have less when we really need it later.

THE NEW SUPPLY.

So much for our stored mature supply. With the growing of new supply it is even worse, for there is less excuse and no salvage. Try to imagine the vast areas that ax has denuded usefully and fire uselessly, lying desolate and as dead a loss as though engulfed by the sea, which might be earning us millions yearly, a source of growing tax revenue, supplying our forest needs, employing labor, supporting industries, protecting streams, sheltering game. Now a menace and a burden, it might contribute to every citizen.

Do you not suppose the owner would prefer to make this land valuable? Now that free virgin supplies are gone, and the cost of carrying mature timber for his future operations is so excessive, the lumberman sees the life of his industry dependent on a new crop. Even if selfish, his interest is as keen as ours. But however optimistically he calculates the probable growth, or the price likely to be obtained, he faces the probability that we will burn his investment up and the practical certainty that taxes will eat all profit before the harvest. We refuse to do what other countries do—let him pay the tax when the crop demonstrates wealth that ought to be taxed and affords revenue with which to pay. We ask him to carry a risky investment for fifty years, with interest to pay and no returns, and also to pay annual taxes which with compounding interest will bring his entire cost beyond what we could ever afford to pay him for the crop even if he has the funds in advance to finance such a remarkable project.

After this review of our policy to encourage good management of private forests, old and new, let us see if we would apply it to an agricultural resource. Burn up part of it; waste the rest cheerfully; devise a tax to punish keeping it till we need it, so as to hasten disposal abroad; forego a larger tax we might collect by less waste; by no means pay enough to encourage the producer to improve his methods; threaten him with cutrate competition, of we can catch him at particular disadvantage, with resources of our own that we can ill spare for such a purpose; and finally, if he considers trying again with a new crop, promise to prevent this by confiscatory taxation. Now is this our real desire regarding forests? Certainly not. It is only the accidental result of never having taken the trouble to study the foundations of one of our greatest industries. But it is what the rest of the world regards as American forestry. I have had Japanese foresters ask me to explain it. Definitions again. We do have forest schools, forestry associations, state and national foresters, and even women's forestry clubs. But do we know what it is all about?

Let us turn to state and national forestry. We have a national forest system, with nearly 200 million acres under its control—a tremendous empire in itself. You understand that the service charged with its management is competent and loyal. Surely, you say, here at least we are in the van of progress.

Here is a stupendous task, involving the protection of existing forests, restocking denuded areas, and disposing of the product so as best to serve the entire nation. To withhold funds necessary to this work is letting an immensely profitable plant lie idle, as well as in danger of destruction, to save the cost of fuel and watchmen. To mismanage it is worse, for this one-fifth proportion of our national supply cannot but influence the four-fifths under other control upon which we are even more dependent.

Yet even here we are without a national policy. The Forest Service can neither announce nor execute such a policy as long as there is extreme variance in the views, not only of the States, whose attitude toward their own forests and forest industries has a profound influence, but also in Congress where any executive policy, to be dependable, must find sanction and support. European countries, Japan, even China, seek farseeing and expert determination of the principles involved, but every session of our Congress sees the whole subject debated from a dozen viewpoints, chiefly political, seldom statesmanlike, and always without real knowledge of forest economics. Instead of setting an example, we spend less per acre for care of our forests not only than other governments but than our own private owners upon contiguous lands. Retrenchment which does not extend to the "pork barrel" is practiced vigorously when dealing with protection of the lives and resources of the people. Pressure for the sale of timber to a sacrificial and demoralizing extent is brought through penny-wise ignorance or to "grandstand" against a mythical lumber trust for political purposes.

Now all this is not chiefly the fault of politicians. There is nothing for them except so far as it can be made to strike a responsive chord in their constituents. With the public half so well informed on the production of the lumber it needs as it is upon the getting of its parcels by mail or the price of sugar there would be an expression on an American forest policy that would leave no statesman uncertain. We cannot blame him if there is no such expression. We don't know ourselves, that is all.

The same is true of our States. Few have comprehensive far-seeing policies, covering their own oportunities on State-owned forest lands and adequate encouragement of good private management. Yet here, of all places, it is the commonwealth that determines. It is State intelligence and State pride that dictates to the representative in Congress and, in its own laws and their enforcement, makes forestry a real instrument for good instead of a grudging concession to reformers. And State intelligence will not be exerted until we stop making forestry an abstract problem of public or private conscience. Abstract ethics do not get results like fear of personal injury or hope of personal gain. It is futile to discuss the needs of posterity and present sacrifice as a duty. The average citizen must come to see that bad forest management, in this country of ours, means a handicap of industry, harder conditions of life, not only for his children but for him as well. Whenever an acre of forest is destroyed by fire, forced into wasteful use, or not grown where it might be grown, he bears most of the loss.

Nor is this enough. Though he recognizes the evil, it will not be remedied until he knows its practical working reasons, so he may concede when he must and demand where he may; not create further confusion through sentiment, ignorance, or prejudice.

* From an address at the midsummer meeting of the Board of Directors of the American Forestry Association at Chautauqua, N. Y.

A Group of Alaskan School Children.

CONSERVING NATIVE ALASKANS

ALASKA has an area approximately equal to one-fifth of the United States and in this continental region there are about 25,000 natives in villages ranging from 30 to 40 up to 300 or 400 persons, scattered at intervals along its thousands of miles of coast line and on its great rivers.

During eight months of the year all of the villages in Alaska, with the exception of those on the southern coast, are reached only by trails over the snow-covered land or frozen rivers. Many of the native villages are remote from the main lines of travel, with no established means of access. In spite of the inherent difficulties of the problem, the Bureau of Education has established a United States public school in each of 70 villages, with 97 teachers, each of whom is a "settlement" worker striving to elevate the natives, adults as well as children, intellectually, morally and physically.

In many of the villages the public school is the only agency striving for the uplift of the natives. Each school house is a social center for the accomplishment of practical ends. Many of the buildings contain, in addition to the recitation room, an industrial room, kitchen, quarters of the teacher, and a laundry and baths for the use of the native community. The schoolroom is available for public meetings for discussion of affairs of the villages or, occasionally, for social purposes.

In the native villages the teachers and nurses endeavor to establish proper sanitary conditions by inspecting the houses, by insisting upon proper disposal of garbage, and by giving instruction in sanitary methods of living. Natives are encouraged to replace their filthy huts by neat, well-ventilated houses. In some sections the natives have been taught to raise vegetables,

which are a healthful addition to their usual diet of fish and meat.

There are extensive regions in which the services of a physician are not obtainable. Accordingly, it often becomes the duty of a teacher to treat minor ailments, to render first aid to the injured, or to care for a patient through the course of a serious illness.

The Bureau of Education fosters the establishment of co-operative stores and other co-operative enterprises owned and managed by the natives themselves. By thus relieving themselves of the burden of the profit exacted by the middlemen, the natives are able to secure the necessities of life at the lowest prices and can at their own local stores obtain equitable value for their furs, ivory, woven baskets, and other native products.

The 70 school buildings are valued at $247,411, and the school equipment and furniture at $65,000. The appropriation for education is $200,000 a year, of which $36,000 is used for medical relief of the natives. The school enrollment is approximately 4,000. About 1,500 native children in remote villages are still to be provided with school facilities.

MEDICAL WORK.

There is no specific appropriation for the support of medical work among the natives of Alaska. For several years the Bureau of Education has been striving, without success, to secure funds for use in making proper and adequate provision for the checking and prevention of the diseases which, beyond question, prevail to an alarming extent among the native races of Alaska. It has succeeded in securing a modification of the terms of the appropriation for education of natives of Alaska which enables it to employ physicians and nurses. It cannot erect the hospitals which are so greatly needed.

Realizing the absolute necessity for action, the Bureau of Education is using $36,000 of the $200,000 appropriated for the education of natives in employing nine physicians, nine nurses, in supplying the teachers with medical chests for use in treating minor ailments of the natives, also in maintaining three improvised hospitals in school buildings in centers of native population where hospitals are most urgently needed, and in making contracts with four hospitals for the treatment of diseased natives.

Nearly 1,800 cases were treated in the hospitals at Juneau, Nushagak, Nulato, and Kotzebue during 1912-1913. The most prevalent diseases were tuberculosis, trachoma, rheumatism and venereal diseases; the surgical operations included excisions for tubercular diseases of the bones, the removal of tubercular glands, laparotomies, curetting of ulcers, setting broken bones, sewing up recent wounds, and excisions of hemorrhoids, cataracts, abscesses, tonsils, and adenoids. During the year epidemics of infantile paralysis at St. Michael and of diphtheria at Nulato were checked by physicians employed by the Bureau of Education.

Referring to the medical work of the Bureau of Education in Alaska, Dr. Emil Krulish, Passed Assistant Surgeon, United States Public Health Service, detailed to investigate health conditions among the natives of Alaska, makes the following statement in his official report:

"This improvement in the Sitka village, which is an example of the improvement in other sections of Alaska, I attribute chiefly to the influence and efforts of physicians, nurses, teachers, and hospitals now under the Bureau of Education. It demonstrates the fact that the outlook for the general improvement of the native is encouraging and the task is feasible."

BOYS MAKE BIRD HOUSES

BIRD houses that are not only an artistic addition to any estate but are a positive enticement to birds, and an inspiration for bird lovers, are now being made by the boys of Allendale Farm. They are suitable for all the birds which one might desire as friends and neighbors in either city or country, and when they are erected in the proper environment they are not long unoccupied. The making of these houses is a labor of love for the Allendale boys, because on their beautiful, well kept farm at Lake Villa, Illinois, they quickly become nature lovers and acquire a knowledge of the value of birds and the joy of their cheering companionship which many another boy might envy.

The bird houses are sold and an attractive little circular tells what they are and how much they cost, as well as showing sketches of the different models, and it is worth noting that lovers of birds have become purchasers of many of these dainty little structures.

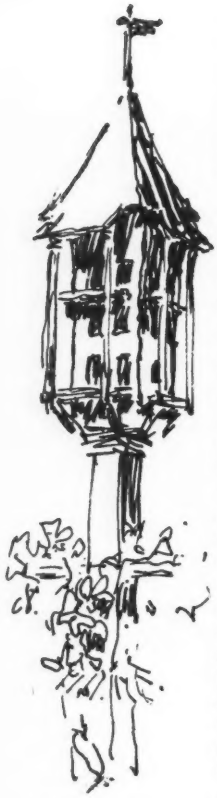
There are the Martin houses which should be, we are told, placed on a clean pole sixteen or eighteen feet from the ground, in the sunlight away from the shade of the trees, and there is added the note, with the comfort of the birds in mind, that the closed side of the houses should face the north so that the birds may be protected from the cold north winds. These houses cost from three to twenty-five dollars.

Then there are the houses for the dainty little wrens. These houses should be placed not more than eight or ten feet from the ground and may be located close to a residence. They should face east; there will be no danger of the wren oversleeping himself with the early morning light shining full in his little doorway, and the wrens like these houses best when they are in close to a bush or a tree. These houses cost only a dollar and a quarter, for they are small and simple. There is also the bluebird house and this costs the same as the residence of the wren. It may be hooked to a tree or placed upon a twelve foot pole in the open or among the fruit trees.

The Allendale boys also make attractive food shelters, a box-shaped affair with open sides and a sloping roof. These are mounted on stumps, the food is placed on the floor and the roof protects it from the weather. These food shelters are speedily discovered by the birds and if the right kind of food is placed in them the birds flock to them and soon make their homes in the vicinity. There is also a robin shelf which is another type of food shelter and artistic as are the others.

AN ALLENDALE BOY WITH A BIRD HOUSE HE HAS MADE.

Now, Allendale is a colony or farm for homeless and neglected boys where they are protected, reared and educated. It is supported by voluntary contributions and the boys are sent there by men and women who are interested in the Association, the official name of

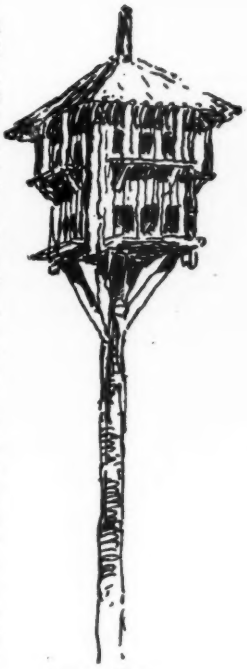


A MARTIN HOUSE.
Lawrence Buck Model with 16 Rooms.

which is the Allendale Association of Chicago. The farm is at Lake Villa, Ill. It comprises 120 acres of good farm land. The boys take care of this and it is a model farm. In addition to caring for the farm they make excellent progress in their studies and, as the bird houses indicate, are clever at various handicrafts. There are five cottages, each with a mother and a family of twelve to sixteen. Each family takes care of its own house, has its own possessions and separate rooms for its members, its fireplace and books and such trophies as boys collect and cherish. The meals are cooked in a central kitchen and distributed to the various families who have their own table and dine together. There is an admirable school with able teachers, a laundry where the boys help the laundress, the big kitchen with the boys as assistant cooks, a manual training and repair shop well equipped; gymnasium and drill hall for winter sports, and in fact all things that are essential to the physical, mental and spiritual training of the boys.

The making of the bird houses was an outgrowth of the boys nature study and coupled with it is the boys aid in the nation wide movement for bird protection. The boys in their spring tramps learned to recognize and distinguish the early migrating birds as they returned week by week and a careful record was kept and the name of each classified bird was credited to the observer, while the teachers aided by frequent talks on the habits of birds. On Arbor and Bird Day last May Audubon buttons were awarded to boys who knew ten or more birds, and one boy established a record by naming forty-five birds.

Out of this study developed the decision to manufacture and sell bird houses, and as the carpenter shop is well equipped and the boys have special training in the use of tools the work soon became not only financially successful but a positive delight to the boys. To add to their interest is the fact that each gets ten per cent. of the sale price of the bird houses he makes, and while the industry is not yet a year old a good business has been built up and it is steadily growing.



A WREN HOUSE.
Quincy Model.

A director says of Allendale and the work done there:—

"We have perhaps too little thought of Allendale in her relation to the great uplift movement. We have been entirely concerned with the individual boy, his quality, tendencies and progress, and each year have sent out a small group and made an annual report of the expenditure of a large sum of money; and those bent on striking a balance have perhaps felt that results were not commensurate with the outlay. But we must

BLUEBIRD HOUSES.

PHOEBE OR ROBIN SHELF.

remember that when we increased our number from the original five to seventy-five we took our place in the costly movement of Institutionalism, and that we are in the press of a day whose watchwords are equipment and efficiency. So in counting the cost we must consider our dues to this larger account. It will not be out of place to say here in privacy of our annual meeting that a certain representative of the German Judiciary sent here to visit American institutions, when asked by a resident of Hull House what had most impressed him, replied without reservation "Allendale."

A short time ago a Japanese student of sociology said that his visit to Allendale had crystallized his idea of what he wanted to do on his return to his native country. The letters of appreciation from an English delegate to the Prison Reform Congress, and those of some Russian social worker, who were our guests, suggest that our work together for the individual boy is yet not without bearing upon the great question of child welfare. However, Allendale's chief concern must always be the individual boy. We are willing to work in this slow, costly way because it seems to us the only way to work, and because the redemption of society can only come through the redemption of its units. The Alumni speech of one of the seventy is somewhat illuminating and perhaps of more value than the words of any onlooker. He had come to us years ago, a rollicking young Irishman, and on returning to the city to High School, the only opportunity for a living that presented itself was to take charge of the dormitory of a working boys' home. "Some of the boys were men," he said, "and most of them older than I was. They were the roughs and toughs of Chicago, but my Allendale experience stood by me; I saw that the difference between those fellows and myself was my training."

MARTIN HOUSE.
St. Armand Model, Twenty Rooms.

A Planting of Catalpa.

THIS WAS GROWN FROM SEED PLANTED IN MARCH, 1909, THE SEEDLINGS BEING TRANSPLANTED THIRTEEN MONTHS LATER AND THE PHOTOGRAPH TAKEN IN MARCH, 1914.

A CATALPA GROWTH

PRESIDENT ADALBERT STRAUSS, of the Malvern Lumber Co., of St. Louis, Mo., sends AMERICAN FORESTRY the picture at the head of this article. It is a view of his catalpa speciosa plantation, near Malvern, Ark., which he says he believes will compare favorably in straightness and length of bole with any other. The following description is given:

We sowed the seed in March, 1909.

Seedlings transplanted April, 1910.

The year's growth cut down to the ground in March, 1911.

Protographs taken in March, 1914.

The man in the picture is fully six feet tall.

The land is cut-over pine, thin, sandy loam, with gravelly clay subsoil.

Do you not think the growth of three years, from the time the saplings were cut down, quite remarkable?

The background shows natural reproduction of pine, having been cut over twice since 1880.

CANADIAN DEPARTMENT

By ELWOOD WILSON

THE sole topic in Canada at present is the war and Canada is determined to stand by the Empire to the last gasp both with men and money. A million bushels of wheat have been contributed by the Dominion Government, large quantities of cheese and potatoes and other products by the several provinces and all the employees of the Canadian Pacific Railway have given a day's pay each. Nearly 23,000 men are in training at Valcartier, near Quebec, awaiting the call of the British War Minister. Meanwhile an era of retrenchment and economy has set in which, while wise in principle, has been carried too far in practice. Many firms have stopped work and all have cut down their forces, throwing thousands out of employment just at the beginning of winter and much suffering will ensue. Outside of the fact of war there is nothing in the state of business to warrant such drastic curtailment, as Canada is now in a position to supply to Europe and South America all the goods heretofore made in Germany, France, Belgium and Austria. By this curtailment she is likely to lose these opportunities.

Apropos of the above an English agent has been sent out to Canada to buy for the English colliers over 80,000 cords of mine props, five feet to six feet long and averaging five inches in diameter. The supply has been shut off from the countries lying on the Baltic Sea and the mine owners have been compelled to turn to Canada. Any kind of wood will be taken, but it will be a difficult matter to get these timbers and not an unmixed blessing for the forests. Owing to Government regulations such sizes cannot be cut on Crown lands and the whole amount must be obtained from freehold lands mostly in the hands of men owning from two to three hundred acres. If such trees are cut as will be suitable the future supply of pulp wood will be very materially decreased and the trees will be cut at the time when they are making their most rapid growth.

The forest fire situation has been very good this year in Quebec with one exception. Early in the spring there was a severe drouth and right in the height of the dry weather the contractors for the new Government Railroad ordered their section men to burn old ties. The fire rangers warned them not to, but in spite of this they persisted and the fire spread over twenty-five square miles, entailing a cost of over four thousand dollars to extinguish it. These same contractors' engines set fire along

sixty miles of railway, burning the timber back in some cases more than a mile from the track. On August 2d eight fires were still burning. This new railway has not yet been put under the control of the Railway Commission's Fire Protection Department and both the Province of Quebec and the Fire Protective Associations are powerless. This shows a curious anomaly. A Government striving with all its might to prevent forest fires and yet itself setting the most of them and devastating a virgin country whose only resource is its timber.

Professor Toumey, head of the Yale Forest School, is making a long canoe trip through the central part of the Province of Quebec with Messrs. Rothery, of Vitale & Rothery, and Mr. S. L. de Carteret, of the Quebec & St. Maurice Industrial Co. They will make an examination of the timber and discuss the best methods of handling. On their way in they visited the Laurentide Company at Grand Mére and were the guests of the Forestry Division.

Mr. Piché, Chief Forester of Quebec, is planning extensive improvements to the Government's Nursery at Berthierville. He will build a commodious house for students and visitors and expects to increase the capacity of the nursery to 1,000,000 trees per annum.

The Quebec Government has postponed its auction sale of timber limits owing to the war.

Hon. W. H. Hearst, Minister of Lands, Forests and Mines in the Ontario Government, has under consideration a scheme to develop the country and at the same time give work to the unemployed. It is to open up alternate quarter sections of land in Northern Ontario by clearing the land and selling the pulp wood. This would prepare the land for settlers at practically no cost to the Government, probably at a small profit. No mention is made of what disposition would be made of the hardwoods.

An investigation of forestry conditions has been made in England and it is shown that there are large areas of land which are only suitable for growing timber and it is estimated that in time $180,000,000.00 worth of pulp wood could be grown. This is now imported.

The Lower Ottawa Forest Protective Association has had a busy season. At one time five hundred extra men were taken on to extinguish fires. Forty settlers have been arrested, convicted and fined. This will make the work of fire protection during the coming season much easier as the settlers will now have some respect for the laws which had practically become a dead letter through lack of enforcement.

The fire situation in British Columbia has been the worst since 1910, especially in the southern part. Alberta and Northern Ontario have also suffered badly. There is great need for the elimination of politics and the introduction or extension of the merit system in both the Dominion and Provincial Governments.

Ten thousand tons of wood ready to be made into pulp were destroyed on July 24th at the Mills of the Gres Falls Company, the Canadian Subsidiary of the Union Bag and Paper Company at Cap de la Magdelaine, near Three Rivers, Quebec.

Mr. J. S. Bates, who is in charge of the Dominion Forest Products Laboratory, has returned from a trip to North Carolina, taken with the object of investigating the possibilities of distilling British Columbia yellow pine.

The reindeer imported by the Laurentide Company have been successfully distributed to two of their depots and training them for sled work will begin next month. This company have added to their forest plantations 44,000 Norway spruce and red pine from their own nursery, which has been nearly doubled in size.

EDITORIAL

WITH a business sense which is most commendable, the National Forest Reservation Commission, acting upon the advice of the Forest Service, has, after waiting three years, finally completed the purchase of an 85,000-acre tract of forest land in the White Mountain region. This tract cost at the rate of $8.50 an acre, whereas, had it been purchased three years ago, the price would have been $28.60 an acre.

At the time the purchase was first proposed the members of the Commission fully appreciated the desirability of acquiring these lands to add to those already secured in the Appalachian system, but officials of the Forest Service, after a painstaking investigation, reported that the price was far too high. Since then, although the members of the Commission were at times criticized for not taking over the tract, the effort to have the price reduced has continued until it now becomes Government property at a saving of practically twenty dollars an acre, or a total of about $1,700,000.

The land includes Mt. Washington, Mt. Jefferson and Mt. Adams, all of which, owing to their scenic value as well as their value as a health and a recreation ground, properly belong in the Appalachian reserve, and now will become the property of the people for all time. The Department of Agriculture, through the Forest Service, will encourage the public use of these lands in all the ways that it is feasible to use them and particularly for summer camping grounds, it being contended that summer campers, with proper restrictions as to their use of the forest, are of actual value in taking care of the forest. Another value which the purchase has, and a great one, is the protection of land which is the keystone or the hub of the drainage system of the White Mountain area.

Many careful students of the forest conditions predict that the growth of timber on Government land in the Appalachian system will in the future be of decided importance in supplying the lumber markets in the East, and such a growth will come with the protection of the land which is assured by its administration by the Forest Service, and by the replanting of denuded sections, which is one of the plans in the future management of the land.

There are a number of other areas which should also be acquired and it is quite safe to venture the prediction they will be when the price is satisfactory and the money is available.

TOO little appreciation of the value of shade trees is evident in many towns and cities throughout the United States. The residents and the city officials do not realize how much more attractive their city would be if it had well-shaded streets and trees about the residences. Perhaps this is because the majority of them have never seen such streets, as, for instance, those in Washington. It is a condition which may

be overcome by education, and AMERICAN FORESTRY proposes to devote some space each month in the future to articles and discussions relative to shade trees, the kind to select for different street conditions, how to cultivate them, protect them from insects and disease and how to treat those which are decaying.

There is need for experts in shade tree conditions who are competent to fill positions for the care of a city's trees, as it will not be many years before all the progressive cities in the country will have shade tree commissions, or departments having power to engage men to care for their shade trees. Provision is now being made for the apparent need of these men by several of the colleges which have already inaugurated, or are contemplating inaugurating, a department for the training of experts in shade tree work.

Several cities where the value of such trees has been appreciated, have shade tree departments which not only provide for trees owned by the public, but give service for those privately owned, and in every instance, where the management is competent and the appropriation sufficient to meet the needs, the citizens have reason to be proud of the result.

WHILE it may be many years before municipal forestry appeals to a number of communities in the United States, the fact that it could now be profitably conducted by many of them is certain. There are close to nearly every city, particularly in hilly or mountainous sections, tracts of waste land, some once having a luxuriant forest growth, which could be acquired for a comparatively small sum. On these tracts a city could establish a municipal forest which would not only be a profitable investment but could, if required, be used in part as a public park.

This waste land, planted at slight cost, with seedlings in many States provided free of charge, would in a few years become productive and in a generation or two or three be a source of considerable revenue to a city.

When it is stated that all of the taxes of many German towns and villages are paid, electric lights, power, paving and all town necessities provided free of charge out of the revenue derived yearly from municipal forests, the reply is often that conditions are so different in this country. True, they are different, but they are growing less so. Timber in the United States was in the past so abundant that few ever thought of the need of conserving it, but for some years past serious thought has been given to the timber needs of the future and how to provide for them, and the problem is not yet solved by any means. Municipal forests would not provide for all that might be needed a hundred years from now, but they would certainly prove a source of revenue to any city owning them. Therefore, as it is quite true there is waste land close to nearly all cities, and as this land could be purchased, planted and protected at small cost, good judgment declares that it is practically the duty of wide-awake communities to give some thought to the question of what they may be able to do in this respect.

NO MORE striking demonstration of the value of various accepted systems for protecting the forests from fire can be had than the reports which are now being received of the results of the fire season which has about reached its end. This is particularly so in relation to the heavily wooded Pacific slope. The season has been an unusually bad one all throughout the country. Rain has been scarce and hot weather and drouth prolonged, and in addition to the danger thus caused the winter was mild and far less than the normal quantity of snow lay on the forested slopes.

These conditions increased the danger of fire starting and of the flames spreading rapidly to a very great degree, and yet all the reports indicate that the fire losses for the season are comparatively small. There have been numerous fires, more in number than in any season for some years past, but the quickness with which such fires were discovered by the forest patrols and fire wardens and the rapidity with which, under well organized systems of protection, it was possible to get fire-fighters to the danger points resulted in the fires, in the majority of cases, being extinguished quickly or else confined to an area where they did but little damage.

While the newspapers may have, in their reports of fires, conveyed to the public mind the impression that tremendous damage was being done and that fires were sweeping the forests for miles, investigation showed that many of the fires which received the most attention from the press were on brush land of comparatively little value and that the losses thereby were trifling.

The reports so far received by the American Forestry Association lack detail. This will come later and be of decided interest, for it will then be possible to report the actual loss and the actual cost of the fire protection work. Warned by the light snows that the season might be a bad one, the Forest Service, State organizations and timber protective associations early prepared themselves for a hard campaign, with the result that the fire patrol was more than ever efficient, and more patrolmen were placed in the national, State and private forests than in any year since the necessity for fire protective work became apparent. There was also marked improvement in means of communication with fire-fighting headquarters, more telephone lines to mountain lookouts were built, more roads and trails for quick access to danger points were opened and more money was spent than in any previous year, but all this proved, as the nature of the season developed, the best kind of safety insurance.

It is certain that the success of the protective work during the season will result in the formation of more organizations by private owners and give an additional impetus to national and State forest protection work.

THE Secretary of Agriculture has just signed an agreement with the State of West Virginia for co-operative protection of the forests of the State from fire. The Weeks law authorizes the Federal Government to undertake such co-operation with States for the protection of forested watersheds of navigable streams, provided the State has a fire protective system and will expend a sum at least equal to that expended by the Government.

The agreement provides for patrol of those portions of the watersheds of the Potomac, Monongahela, Little Kanawha, and Great Kanawha Rivers where fires are most likely to occur. Lookout stations connected with telephone will be established on prominent points, from which fires can be discovered quickly, and prompt notification given to the patrolmen, county fire wardens, and other reliable persons. Patrolmen will cover on foot or horseback the lower country, extinguishing any small fires that may start and cautioning persons met in the woods against carelessness.

For this work the State will expend $5,000 a year from its appropriation of $10,000 for forest, game, and fish protection, and the Federal Government agrees to expend an equal sum.

This protection will go hand-in-hand with the work already being done by the Federal Government on the areas it has purchased in the State for national forests. It has been demonstrated, according to forestry officials, that the greatest efficiency is secured through the co-operation of all protective agencies, including the national Government, the State, associations of private timber owners, railroads, and other organizations.

FOREST NOTES

Wherever trees in quantity are needed for shade and ornament there will be need of a trained arborist to care for these trees. In our State and National preserves, as well as in many of the large city park areas, and in woodland areas, privately owned, men are really needed with a training not only in forestry, but also in landscape engineering. Many cities are now employing trained city foresters. For example, the city of Buffalo, N. Y., during the last eight or ten years has employed a trained city forester. Last year the city expended about $75,000 for city forestry work. Today Buffalo is recognized as having the best tree growth of any large city in the country. The widespread interest in shade trees which is being manifested seems to indicate that in a very short time there will be a great demand for men thoroughly trained in every phase of plant growth.

Upon the recommendation of Secretary Lane, the President recently eliminated from the Fishlake and Manti National Forests in Utah 45,870 acres of land. This land will be subect to settlement only under the homestead laws from and including 9 o'clock a. m., October 19, until and including November 15, 1914, and thereafter will be subject to entry and disposition under any of the applicable public land laws. The lands are largely unsurveyed and are in Sanpete and Sevier Counties.

Upon the Secretary's recommendation, the President has also eliminated from the Challis, Lemhi, Salmon and Sawtooth National Forests in Idaho, 193,660 acres. These lands are largely unsurveyed, high, grazing lands and are in Blaine, Custer, Fremont, Jefferson, and Lemhi Counties. About 176,100 acres are unentered and all of the lands are withdrawn except 308.50 acres which are in a power-site withdrawal.

With the increased attention that is being given to all matters pertaining to the right development of shade trees and the improvement of areas for the growth of these trees, there is a demand for men thoroughly trained along lines of arboriculture of city forestry. To properly prepare young men for positions which are constantly opening in this comparatively new field of work is the object of a well developed four years' course which the New York State College of Forestry is giving at Syracuse University.

Under a special Act of Congress two years ago, the State Agricultural College of Colorado was granted the privilege of selecting certain tracts of forest land lying either within the national forests or the public domain for use in carrying on the work of the course in Forestry at this institution. This land is selected in areas of not less than forty nor more than one hundred and sixty acres each and includes all conditions from timber line to the plains.

This land has recently been selected and is now being surveyed and marked. It includes some of the best stands of timber to be found in this region. Some of the areas are open land adapted to experiments in high altitude agriculture. These tracts should furnish excellent places in which to carry on the field work connected with the course in Forestry here.

An inspiring musical composition lately published is "The Call of the Wilderness," words by Mr. Scott Leavitt, forest supervisor at Great Falls, Montana, music by Miss Augusta B. Palmer, of the Forest Service, Washington, D. C. The song has been dedicated to the forest rangers. It is especially adaptable to Arbor Day exercises and to forestry and conservation programs. "The Message," words and music by Miss Palmer, published coincident with "The Call of the Wilderness," is a charming little song of the fields and woods.

A short time ago the presence of several members of the Washington office of the Forest Service at the headquarters of District 3, in Albuquerque, New Mexico, where field duty had taken them prompted the members of the District office to propose and carry out a "Get-Together" dinner on a "Dutch treat" basis. The dinner was held at the Alvarado, the Harvey hotel. Those present from the Albuquerque office were: A. O. Waha, acting district forester in charge of the branch of operation; John Kerr, assistant district forester, in charge of the branch of grazing; A. D. Read, forest examiner of the office of grazing; T. S. Woolsey, in charge of the branch of silviculture; Quincy Randles, timber sale inspector, of the office of silviculture; J. O. Seth, assistant to the Solicitor, Department of Agriculture; Lyle A. Whitsit, hydro-electrical engineer; M. M. Cheney, national forest examiner, of the office of lands; Frederic Winn, in charge of land classification, of the office of lands; and James F. Mullen, supervisor of the Manzano-Zuni Forest. Those present from the Washington office were: Albert F. Potter, associate forester, in charge of the branch of grazing; J. T. Jardine, inspector of grazing; R. Y. Stuart, forest inspector in charge of timber sales, of the branch of silviculture; Bristow Adams, forest examiner, in charge of the office of information; also W. S. Clime, photographer of the Department of Agriculture, and F. F. Moon, professor of forestry at Syracuse University.

Thirty of the Iowa State College forestry students have returned from summer camps held on the Minnesota National Forest. The camp was located on Star Island in Cass Lake, where fine virgin stands of white pine, red pine and jack pine occur. The camp consisted of twelve weeks' work. The work comprised timber estimating, topographic and type mapping, silvicultural studies, logging, milling, minor forest industries, dendrology and tree diseases. The region of the Minnesota National Forest offers spendid opportunities for the study of logging and milling first hand. The region also presents many silvicultural problems for the student of forestry. The Iowa State College is planning on making the camp at Cass Lake a permanent affair.

The purchase has just been completed by the State Forester of a tract of about 3,000 acres in the town of Underhill, Vermont. This area, which is now the largest of the State's forests, lies on the west side of the Green Mountain range just south of Mount Mansfield. With the exception of about 100 acres of burned land, the whole area is well wooded. It is fortunate that the State could acquire it before the mountain was stripped, because the lumber supply will not only be of great value to the town, but the two streams rising on the tract, Stevens Brook and Lee River, would be seriously affected by deforestation. The price paid was $3.25 an acre, considerably less than that first asked.

The State Forester is now having a map and careful estimate made of the

entire forest, and intends to begin the improvement of the tract as soon as practicable. The open areas will be reforested next spring, and improvement cutting made as soon as a good market can be developed for the weed trees.

One of the points of interest in this forest is a very beautiful water fall, one of the finest in the State, especially in early spring. The acquisition of this tract makes the total area of State forests about 8,000 acres.

M. J. Nagel, of Santa Fe, N. M., was recently in Washington to give to Senators from his State his views regarding the replanting of denuded forest lands and the gathering of forest seeds. He secured the publication of some vigorously worded statements in the Congressional Record. He says he can teach and will take the contract to reforest every acre of denuded land, abandoned farms and fields in the United States for less than $5 an acre and guarantees that all the planted area will grow. He calculates that his method will save fifty million dollars in replanting seven and a half million acres. Mr. Nagel says he is eager for a chance to prove his statements, but has not yet found the opportunity to do so on a broad scale.

Residents of Lake Forest, Ill., stirred by the fact that the shade trees on the streets of their attractive town are not getting the proper care, recently held a mass meeting and presented to the City Council some resolutions demanding vigorous action. They mean to see that the City Council does not neglect their request and will do all they can to beautify their streets and gardens by planting appropriate trees and shrubbery and seeing that those already planted receive proper care.

The resolutions quote the fact that the care of trees and shrubbery against ravages of insects and disease is being weakened by ill-advised planting of trees not suitable for the ground and climate and asking the City Council to appoint a permanent commission to safeguard the trees of the city, this commission to be empowered to superintend such conservation and forestry work as is deemed advisable, to insist on co-operation from private owners, and if possible join with other towns in the vicinity in engaging a competent forester to oversee all advisable work.

Many are the methods prescribed for estimating the value of a shade tree and one of the most recent is that of asking real estate men: "How much, in your judgment, do full-grown shade trees along the street improve the value of the adjoining land for house lots?" This question was asked by the Massachusetts State Forestry Association. The majority of answers ranged from 10 to 50 per cent., while some went so far as to state that a house lot would be worth 100 per cent. more if full-grown shade trees were standing in front of it. A fair average of these answers falls between 25 and 40 per cent. Expert tree appraisers say that a shade tree in good condition and well placed is worth $1 per square inch of cross section measured at breast height. At that rate a tree one foot in diameter is worth $113, while a tree two feet in diameter is worth $452. For the sake of illustration, suppose that we take a good-sized house lot, 50x100 feet, or 5,000 square feet, worth 25 cents a foot. The land value is $1,250. If the trees are spaced 50 feet apart on the street there would be one tree in front of the property. The tree is two feet in diameter and worth $452, which would increase the value of the lot 36 per cent.

Donald Matthews, a graduate of the University of Michigan in the class of 1909, has recently accepted an important position with the British North Borneo Company. Although Mr. Matthews is a young man, he has made a record during the last five years in the Philippine Forest Service. He will organize an expedition into the interior of North Borneo and after examining the timber resources of that section, will determine what sort of a forestry department should be organized there.

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